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Contributions.

Colors for Signal Lights.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with interest Mr. A. H. Johnson's remarks and your comments on same in your issue of Nov. 23, and although you and he think that a satisfactory solution as to the color of signal lights has been arrived at, the subject admits, I think, of further consideration and discussion.

At the commencement I would say that color-blindness will not be taken into consideration by me, because I assume that proper care will be exercised in the constant examination of trainmen, and that those afflicted with this disability will not be allowed to have charge of traffic movements. A word, before proceeding, as to the names of signals. "Distant," "rear home," "home," "starting," "advance starting," and "shifting," indicate clearly enough, probably, the order of locality, and purposes of the respective signals named, although the "advance starting" signal (introduced after the advent of the "distant" signal), is sometimes more distant from the tower than the "distant" signal, and the "starting signal" is nearer home (the signal tower) than the "home" signal. These names have become familiar, and there appears to be no sufficient reason for changing them.

There is not quite the same unanimity of opinion as to the names designating the indications of which the signals are capable, and their application to certain signals. The words "danger," "caution" and "clear" are sometimes used to indicate the three positions of which some signals are capable. For "danger" "stop" is sometimes substituted, and "all right" for "clear." In England danger by day is indicated by the horizontal position of blades, and at night by a red light on all signals. In the United States the same obtains, except in case of "distant" signals, the blades of which in the horizontal position indicate "caution," and a green light is substituted for red. In England "caution," until this indication was abandoned, being rendered unnecessary by the universal adoption of the block system, was uniformly and exclusively indicated by the 45 deg. angle of the blade for day, and the green light for night. In the United States "caution" is indicated by the 45 deg. angle on some day signals, and by the horizontal position on others, and by the green light on all signals by night.

The English conception of the meaning of "danger" in relation to signals appears to be logical. It by no means follows that because signals are in the horizontal position or show red lights, when a train approaches them, that there is danger anywhere. It is sufficient that the trainmen know that such an indication requires them to stop their train at the "home" signal. Disregard of this indication and requirement means danger, or possible danger, somewhere ahead. Experience in the early days of railway signalling disclosed the imperative need of a timely warning to make it possible under some conditions to stop the train at the "home" signal. Hence the introduction of the "auxiliary" or "distant" signal. For many years after its introduction the "distant" signal did not differ from the "home" signal. It was not necessary, because engineers in charge of trains knew their signals as well as a pianist knows the keys in a piano, and the lower speed of trains then in vogue enabled them to take more deliberate observation of objects approached and passed.

Both the "distant" and "home" signals in the horizontal positions, therefore, mean stop (qualified as regards the "distant"), and possible danger ahead. This being so, it will be granted that the "distant" signal, being the first in every series of signals, and the one approached at the greatest speed, should be as effective as possible, and not liable to be passed unobserved. To all intents and purposes, then, one indication of the "distant" signal is "possible danger ahead."

The early color selected for semaphore blades was vermilion, because it was considered to contrast best with objects adjacent to the signals, and had a more startling effect on the eye than any other color. It is today, I think, the king of colors for arresting attention. For the same reasons the red light was selected to indicate "stop; possible danger ahead." The white light is in too general use for illuminating purposes to attract special attention. Green and amber are mild and soothing to the eye, and lack the arrestive quality.

Granted the desirability of distinction by night, as it exists by day, between the "distant" or warning signal, and the absolute "stop" signal, I suggest duplicating the red light for night "distant" signals in a nearly horizontal line, one on each side of the signal pole. By this means the "distant" signal will be distinctive and emphatic, and will the better arrest the engineer's attention when at his top speed, and consequently when most needed.

HENRY JOHNSON.

Green and Red for Home Signals, Green and Amber for Distant.

CHICAGO, Dec. 11, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have had the privilege of reading the report of the October proceedings of the American Railway Association Joint Committee on Interlocking and Block Signals. Taking into consideration the fact that the gentlemen serving on this committee have undertaken a task which involves the solution of problems difficult even to the experts at signals, their progress has been remarkable. It is true that until quite recently they have confined themselves to the enunciation of what may be termed axioms and postulates, but this shows that there is a proper appreciation of the gravity of the question with which they grapple.

They have now, however, passed to the consideration of the night signal question. They have any amount of practical experience to refer to, in the past and present state of the art, both as regards ocean and land signalling. It should be known, that although any one with correct sight and good judgment can discriminate between bad and good night signals, a knowledge of the science of light and color is necessary to enable a man to cancel bad points and produce the best results. Owing to this lack of knowledge, many devices have been tried which have proved to be failures as night signals.

I trust that by this time we have become fully alive to the necessity of giving up all attempts at shape and form; and let me reiterate that what we want is more light and greater uniformity of colors. When the railroad companies shall have adopted the colors which the Association will recommend I propose that all signal glass, before being used, receive the approval of an inspector who will compare it with a standard, as is the custom with the port and starboard lamps of ships. Dr. B. Joy Jeffries in a lecture before the Massachusetts Institute of Technology, said:

"The nearly 34,000 examinations for color blindness which I have made, and the practical study of marine and railroad signal lights, early convinced me that something must be done to increase the amount of light and strengthen the colors. I said here, four years ago, and it is one of the conclusions in my manual, that experiment and experience show that we are forced to use red and green marine signal lights to designate a vessel's direction, and movements, and at least red lights on railroads, to indicate danger. Form instead of color cannot be used for these purposes. All attempts at shape are ridiculous, and arise solely from lack of knowledge."

It should be understood that Dr. Jeffries refers to signalling where distinctiveness is, or should be, a principal factor. The Doctor's remarks apply to our present lamps. The fact is that the kerosene lamps that have long been standard on the English roads give much better lights, and as to why our roads still go on using an inferior lamp for main line work, I must say that I prefer to answer an easier question. The lamp makers are willing enough to make better lamps, and I may say that Mr. Dressel has recently made several samples at my request. Perhaps the railroads are waiting the advent of a second Aladdin, to exchange new lamps for old ones.

It seems a pity that the committee passed over the "amber" light for use at distant signals, and recommended a combination of red and green lights about 9 in. apart, the safety signal being given by obliterating the red light. Supposing some one obliterates the red light when the signal is at danger and thus gives a clear signal; or supposing this to occur when the red spectacle becomes blocked by snow. Saxby and Farmer tried this combination scheme some years ago, but it was not adopted. My only observations in connection with "amber" lights have been of those seen so often in druggists' windows alongside red and green lights. The color seems to me just the thing for our distant signals. It is the practice on some roads to give a caution signal at the home, to forward trains in permissive blocking. The distant signal color should not be used for that purpose.

There seems to be a disposition in certain quarters to sneer at the veterans of the signal service for not having substituted green for white long ago. They have been aware of much more important points, such as have led to the sacrifice of numerous lives, and we cannot blame them for allowing the red and white standard to flourish, when next to no mishaps can be traced thereto, although tens of thousands of the signals have been in service for many years. I am free to say, however, that I have come to favor the substitution of green for white, although

I treated the matter as of little importance when attacking the illuminated blade about five years ago. But there are dangers to be overcome even with the red and green standard. For instance I noticed a signal showing a dim red light in line with several green gate lamps on a road using the red and green standard.

ARTHUR H. JOHNSON.

The Distant Should Not Be Called a Caution Signal.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The distant signal question has been so prominent in late numbers of the *Railroad Gazette* that perhaps we cannot do better than keep at it if there is anything new to be said. These two questions may be considered. First, what is a caution signal, and is a distant signal a caution signal? Second, what bearing may the answer to this question have on the problem of providing a proper night distant signal?

It seems to me that the terms caution and caution signal are used in connection with a variety of circumstances and are even somewhat variable in meaning in different cases. I suppose that a man who stops a train with a red signal gives a caution when he tells the engineer that trackmen are at work ahead and that a rail may or may not be out of the track; or, in a storm, that there is particular danger for some distance ahead that trees or poles may be blown upon the track. A yard limit sign is a caution signal. A sign warning engineers to look out for trains ahead taking water, is a caution signal; there may not be any train there and if there is one the rear end may be a hundred feet or a half mile back of the water station. A caution is given when a signalman informs an engineer, verbally or in writing, that another train has permission to cross over in the block ahead and may be found at the cross-over between that point and the next signal station, on the track on which the first train is running. In this case the engineer may run at full speed till he comes near the cross-over; if he does not see the other train there he may run rapidly on straight track and slowly when he cannot see far ahead. And particularly in permissive blocking a train is admitted to a block in which there is a preceding train, and the engineer is cautioned verbally or in writing or by one position of a semaphore. Here the caution means that there is a train somewhere between that station and the next; when the engineer cannot see far ahead he must be on his guard to avoid coming up behind the preceding train. Now it is to be observed that in several of these examples the caution or caution signal does not indicate the precise location of the danger or obstruction, and in some it does not indicate positively the existence of any obstruction at all at the moment when the caution is given. And the action of the engineer after receiving a caution must vary according to circumstances. It is evident, I think, that the meaning of "caution" cannot be expressed quite so definitely as in the editorial note appended to Mr. Johnson's letter on "Amber Colored Lights for Distant Signals," in a recent issue—"but in its very mildest form it (caution) means 'get your speed under control as quickly as possible.'"

What does a distant signal at danger mean? At first thought the meaning might seem to have some of the indefiniteness just found in the caution signals; for, if a distant signal is found at danger, all the stop signals interlocked with it may be clear when they are seen by the engineer of an approaching train; and, of course, occasionally there is an actual contradiction when the stop signals are clear from the first and the distant is left at danger for the purpose of slowing up a train. But in this rather abnormal use the distant signal can not strictly be said to become a caution signal, admitting that it is not a caution signal ordinarily, because it conveys precisely the same information to the engineer that it conveys under other circumstances; a certain result (reduced speed of the train) desired by some one is obtained, but the true reason is not given to the engineer at the signal. But, in its normal working, the apparent indefiniteness in the meaning of the distant signal is the same that exists in every rule and order—simply that it is liable to be cancelled or reversed. We must now leave out of account the barbarous interpretation of a distant signal as a "protection" for the rear of a train standing between it and the home signal (with the rear of the train but just inside the distant signal or even, as some of us have seen in practice, pushed a little way back of the signal)—and still, in the sublime faith of the trainmen, under its powerful protection. With this understood, then, I should say that a distant signal at danger means, "Stop at the home signal"—at a definite point ahead. This clear and simple order is delivered at the moment when the engineer passes the signal at danger. Like any other order it may be cancelled (by a clear home signal) at any time after it is issued.

I think it is clear, then, that a distant signal is quite distinct from a caution signal. To be sure, the word caution, in its general sense, may be perfectly applicable to the signification of a distant signal at danger. But when two words mean the same thing an advantage in clearness and precision of expression is gained by limiting each word to a particular meaning or shade of meaning. Perhaps spades and shovels were once alike called shovels. But when it is understood that shovels are shovels that are not spades, the meaning of the word shovel is made clear in a certain degree. And if it is a

good thing to call a spade a spade why not call a distant signal a distant signal and have it understood that a caution signal, if not a perfectly definite thing at present, is at any rate not a distant signal?

If it is true that there is an important distinction between a caution signal and a distant signal, and especially if fixed caution signals are to be used—in permissive blocking, etc., then in providing a night distant signal it is about as important to distinguish distant signals from caution signals as to distinguish them from stop signals. It may be, too, that it is almost as important to distinguish distant from stop signals when they are clear as when they are at danger. It is conceivable that if, on a very dark night, a distant signal light should be out, an engineman might not know that he had passed the distant signal; he might then mistake a clear home signal for a clear distant and proceed at such speed as to pass an advance or other stop signal at danger. The only thing that stands in the way is the rule that a home signal must not be cleared for a train that has to stop at the advance signal, till the train has been brought nearly to a stand at the home signal; and this precaution is hardly infallible. At any rate, what is needed for the distant signal is not a night caution signal but a light or combination of lights that will give the information "This is a distant signal," or, "This is a distant signal at danger." Perhaps the ideal arrangement would be to have on the distant signal the same changeable lights as on the stop signals, and, in addition, a marking light, provided by a double lamp or by a separate lamp, to indicate that the signal, whether at danger or at safety, is a distant signal. If the marking light should go out the signal would appear like a stop signal. If double lamps were not objectionable (and three lamps for each signal is the rule on one or two roads) two red lights side by side might mean a distant signal at danger; two green lights, a distant signal clear. Or again, leaving out the distinction between clear signals, two red lights, a distant signal at danger; one red light, a stop signal at danger, or an unusual danger signal; two green lights, a fixed signal clear; one green light on a fixed signal or elsewhere, caution. If, however, a single light is to be insisted on, no doubt an amber colored light would be an excellent solution of the problem; but let it indicate a distant signal and nothing else.

C. C. ANTHONY.

Old Railroad Books.

14 and 16 John Bright Street,
BIRMINGHAM, ENGLAND.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I see in your Nov. 30th issue, Mr. Leverich speaks of a library containing a mass of material relating to early engineering and that no catalogue is available of it. It may interest him and others that I have issued a catalogue of 130 pages of similar early works, relating to all parts of the world. I have found that there are many gentlemen interested in these early works, and the other day I received a letter from a president of an important American railroad asking me to supply him with as many names of titles of books, pamphlets, etc., relating to early railway days as possible, to help him to bring out a bibliography of them, which he considered is very much wanted. To all those that are interested in such things, I shall be glad to send a copy of my handbook, post free. If others in the same way would give particulars of any old relics they possess, an important list could be got together, which would be invaluable for reference in every engineering library.

EDWARD BAKER.

The Simplon Tunnel.*

The project for tunneling the Simplon has recently taken a more definite shape. Out of a great many propositions for crossing the Alps underneath the Monte Leone, a plan has been evolved which has been approved by the Swiss Government. On the strength of this plan, in September, 1893, a contract was consummated between the Jura-Simplon Railroad and the contracting firm of Brandt, Brandan & Co., in Hamburg, as noted in the *Railroad Gazette* of Nov. 3, 1893.

Alignment and Elevations.—The proposed Simplon project leaves on Swiss territory the village of Brieg on the Rhone River, the present terminus of the railroad on that side of the pass, and follows the left shore of the river for a little over 1½ miles to the northern portal of the great tunnel. The tunnel traverses the Monte Leone in the direction northwest-southeast, in a length of 64,718 ft., or 12½ miles, when it reaches the southern portal on the left bank of the Diveria, a little below the village of Iselle and about 16 miles from Domo d'Ossola, the present terminus of the Italian railroads. The parting line of the watersheds, which at the same time forms the frontier between Switzerland and Italy, is crossed at nearly right angles, 5.65 miles from the northern portal. The tunnel deviates from a straight line at both ends in order to make proper connections with the open road. The northern portal is 174 ft. higher than the southern portal, and the tunnel in consequence rises from the North with a grade of 0.2 per cent., the minimum permissible grade for drainage, to the center, in order

not to have a steeper grade than 0.7 per cent. on the southern half.

The tunnel will be the longest in the world as the following table shows:

	Mont Cenis.	Goth- hard.	Arlberg.	Simplon.
Length of tunnel.....	Feet. 42,145	Feet. 49,148	Feet. 33,587	Feet. 64,718
Time when built.....	1857-1870	1873-1880	1880-1883	.....
Elevation of north or east portals.....	Feet. 3,765	Feet. 3,637	Feet. 4,270	Feet. 2,253
Elevation of south or west portals.....	4,162	3,756	3,995	2,079
Elevation of culmination point.....	4,247	3,788	4,300	2,312
Maximum grade.....	Per cent. 2.2	Per cent. 0.58	Per cent. 1.5	Per cent. 0.7
Maximum thickness of overlying rock.....	Feet. 5,425	Feet. 5,586	Feet. 2,361	Feet. 7,006
Maximum temperature of rock.....	85° F.	87½° F.	66½° F.	104° F.

The Hoosac tunnel in Massachusetts was built in 1854 or 1870 and is about 4½ miles long.

Tunnel Profile.—Abandoning the plan of the existing tunnels through the Alps, which are all double-tracked, two single-track tunnels, 58 ft. between centers, are contemplated for the Simplon. The single-track, lined tunnel profile has a clear section of 27.7 sq. yds. The clear width at the elevation of ties is 14 ft. 9 in., and 16 ft. 5 in. at a height of 6½ ft. above ties. The head-room is 18 ft. Five profiles are provided as follows:

Profile I, not lined, for rock without pressure and of uniform stratification.

Profile II, in rock of irregular stratification requiring a mere lining; haunches and arch of ashlar 1 ft. thick.

Profile III, in rock with medium strong pressure; haunches of ashlar, arch of cut stone 20 in. thick.

Profile IV, in rock with heavy vertical pressure, haunches of coursed ashlar, arches of cut stone 2 ft. thick.

Profile V, in rock with great lateral pressure and in deteriorated rock; haunches of coursed ashlar, 32 in. thick, inverted arch of 16 in., and arch of 24 in. thickness.

Along one side of the tunnel, every 328 ft., small arches will be provided, 6½ ft. wide and 7½ ft. high. Every tenth of them will be made somewhat larger for bell signals and lamps. There will be four large chambers at uniform distances, for storing the tools of the track crew. In the center, a siding of 1,312 ft. length is provided for passing trains.

Geological Profile.—In the Simplon, the sequence of the geological age is uninterrupted from the South to the North, the tunnel going in a stretch of 12½ miles through margarine chalk, gneiss, mica and gypsum. The strata will cross the axis of the tunnel nearly at right angles, but their dip is variable. The rock is well adapted for mechanical drilling; in the mica of the northern end the drilling will progress rapidly, as the rock is of less hardness, and as the stratification is favorable. In the central mass, which is of greater hardness, the desired progress can be safely expected, as the rock is compact for great lengths. The gypsum and dolomite strata are the most dangerous ones for the advancement of the tunnel, but they occur in short lengths only. Water is to be expected in the interior in some places.

For 6½ miles the rock temperature will surpass that of the Gothard tunnel, 87½ deg. and will reach a maximum of about 104 deg. It is proposed to lower the temperature in the Simplon tunnel by ample ventilation and by cold water sprayed under high pressure. For each end an air current of 1,760 cu. ft. per second will be provided, while, in 1878, in the Gothard tunnel, only 71 cu. ft. were used. The air temperature is to be cooled to 90 deg. and the conditions for working will thus become more favorable than in the Gothard tunnel.

Water Power.—The investigation of available water power for the installations have given the following results. At the northern end the Rhone affords a sufficient and reliable volume of water. The construction of one race will give a normal power of 840-horse-power, with a maximum power of 1,180-horse-power. An additional race would increase this to 1,680-horse-power normally, and to a maximum of 2,360-horse-power. At the south end the Cairasca River will give a normal power of 1,630-horse-power and a maximum of 2,260 horse-power.

Contract.—The contract for the construction of the Simplon tunnel provides:

For the power installations, \$1,251,000; for tunnel I, complete, with parallel gallery, \$9,040,000; for tunnel II, completed, \$2,941,000. Total for two single-track tunnels, \$13,232,000. In the above sums are not comprised the acquisition of right of way for the power installations, the track material for the two single-track tunnels, nor the ballasting of tunnel II. The first single-track tunnel must be finished within 5½ years, and the time of construction of the second tunnel is fixed at four years. If the second tunnel is not ordered to be built within four years after the completion of the first one, the contractors are released from the obligation of building it. The contractors in signing the agreement have deposited \$200,000, which guarantee bond will gradually be raised to \$1,000,000 during the progress of the work. A fine of \$1,000 a day is fixed for each day that the work is delayed beyond the stipulated time, and an equal bonus will be paid for each day gained. The tunnel is to be built at the exclusive risk of the contractors, who are also responsible for the laying out of its axis. The contract provides

no remuneration for an unforeseen increase of the difficulties by water pressure, higher temperatures of the rock, etc.; wars, strikes, or epidemics excepted.

General Mode of Construction.—The former projects for a Simplon tunnel were based on the known methods of tunneling, and on account of the great warmth which was to be expected in the interior of the mountain, doubts were had as to its practicability. The method of building two single-track tunnels instead of one double track one, is entirely novel. From the beginning, two galleries will be driven from each end as the basis of the two tunnels, and will be connected by transverse galleries every 660 ft. One gallery, in the profile of tunnel I, will be immediately enlarged to the full tunnel section, while tunnel II will be completed only when the first tunnel does not suffice any longer for the traffic. The clear section of gallery II, 86 sq. ft., is used for ventilation. Its entrance is closed by a door, and air is blown into the gallery by powerful ventilators. The transverse galleries are closed, except the two which are temporarily open, the two forward ones, so that the air current is compelled to pass in through gallery II and out through gallery I and tunnel I, thus ventilating the principal workings. An ample and reliable ventilation is secured in this manner. Gallery II serves further for draining, through a large canal, the natural tunnel water as well as that which has been led in. The excavated material of tunnel I will be taken out through tunnel I, in trains which, empty, pass into it through gallery II and the transverse galleries. With the help of gallery II, the most difficult questions in the construction of long tunnels find a very favorable solution. Tunnel II can be built out in the same way without molesting traffic in tunnel I. Repairs of tunnel I, while it only is being operated, will not cause any greater difficulties than in a single-track tunnel of 660 ft. length. Workmen and materials will pass through gallery II, and the nearest transverse galleries will serve as entrances to the working site.

Galleries I and II are driven simultaneously by Brandt hydraulic drills. At each heading work three to four drills, to which pressure water is fed through one 4-in. pipe line in each gallery. For the slate in the first half of the northern end, a water pressure of 1,026 lbs. per sq. in., and for the gneiss of the second half one of 1,466 lbs. per sq. in. are provided.

Besides these, six to eight drills for the headings, further four drills are contemplated. This maximum of twelve drills, requires per second 4.7 gallons of water of 1,026, or 1,466 lbs. working pressure. The mean daily progress which has to be reached as a minimum with the drills in full working order, has to be somewhat over 19 ft., a progress which seems to be guaranteed by the experiences in other tunnels. In the Arlberg tunnel, the Brandt hydraulic drills averaged 18½ ft. daily; in the Suram tunnel in the Caucasus, a progress of 19½ ft. per day was attained in sandstone and chalk. The improvements of the drills have succeeded in materially shortening the drilling period for one blast, while the stronger explosives increased the efficiency of the blasts.

It becomes now important to reduce also the time consumed in removing the blasted work. Many unsuccessful methods have been devised to mechanically carry the blasted rock backward, but the simplest method, that of loading directly into cars, remained the best one. The contractors expect, however, to make a considerable saving in time by throwing the blasted rock backward with hydraulic power at the moment of the explosion. Thus the rock, of which ordinarily the greatest part lies within a few feet from the bench, thus delaying the new setting up of the drills, are distributed over a greater length of the gallery, and the space for the drills is more quickly cleared. A further advantage is the simultaneous and very energetic cooling of the debris, and of the gallery. Experiments with this new method have given surprisingly good results. The looked for saving in time has not been taken into the calculation, but is regarded as a reserve for unexpected delays.

For the transport of debris out of the tunnel and of tools and materials into it, tracks of 2 ft. 7½ in. gage are used, laid with 40 lb. rails. Each gallery will have one track, and the tracks are to be connected by switches through the transverse galleries. For this reason the cross galleries are built inclined to the tunnel axis. Steam locomotives, weight in service 16 tons, will be used, capable of passing 50 ft. curves. They will have very large boilers, so as to make the up-grade trip into the tunnel with little or no firing. The dump cars of 70 cu. ft. capacity will have metal frames with springs-buffers and elastic draft gear. Each car will have three seats in the front and rear, as after the second year it will be necessary to take the men in and out on trains. The trains will generally enter through gallery II, and leave through gallery I, thus going in the same direction as the ventilating current. In entering, the trains will be pushed, on account of the switching through the transverse galleries, and in order not to trouble the passengers with smoke. At each transverse gallery the locomotive will push as many cars into gallery I as the adjoining working sites require. Before the arrival of a train in the tunnel, the cars which are ready for removal, are shoved by hand into the nearest finished tunnel section, from where they are later taken out by the locomotive.

The principal ventilation will consist, as said above, in blowing a large quantity of air into gallery II, and out through gallery I and tunnel I. The air current is incidentally intended to cool the rock. For ventilation, 53 to 71 cu. ft. per second were used in the Gothard and 106

*Abstract from the *Schweizerische Bauzeitung*, by W. G. Triest, Jr. Am. Soc. C. E.

to 212 cu. ft. in the Arlberg tunnel. The working conditions with the last named air volume were very satisfactory. In the Simplon a maximum of 1,760 cu. ft. is contemplated, which would give a velocity of nearly 20 ft. per second. Such a large air volume will doubtless result in a quick and efficient cooling of the rock, and a further cooling will not be required in the working sites through which the current passes. If necessary, the air could be cooled by water sprays. To drive 1,760 cu. ft. per second through a gallery of $2\frac{1}{2}$ miles length, and 86 sq. ft. section, a hydrostatic pressure of 18.64 in. is necessary, for which have to be added 0.56 in. for loss by friction. To procure such a volume of air at this pressure, 500-horse-power is required at the ventilator shaft, the efficiency of the ventilators taken at 65 per cent. Beside each tunnel portal, two fans of 18 ft. diameter are placed, coupled separately to turbines. Each pair can be coupled to either furnish 1,760 cu. ft. at 19.2 in. pressure, or double the quantity at half the pressure. The working sites which lie beyond reach of the air current are ventilated as follows: Into the lower galleries I and II, water injectors drive air through flues from the last trans-

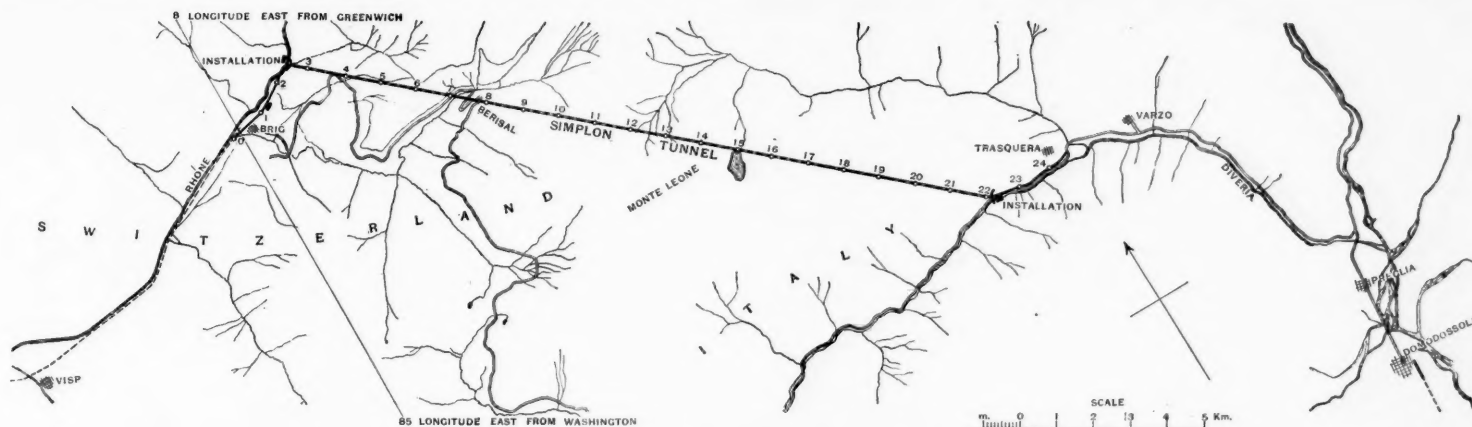
ends when station kilometer five is reached. During the same, 750-horse-power is necessary, divided among the operation of drills, fans, electric light plant and workshops. During these two periods a shaft of 6½ ft. diameter is to be sunk vertically over station kilometer five, down to the tunnel, a distance of about 2,300 ft. Through this shaft a volume of water from the Steinebach, 24 gallons per second is to be carried for drilling and cooling purposes. The last period comprises 2 to 2½ years, and requires 500-horse-power for ventilation, 200-horse-power for electric lighting, and 100-horse-power for workshops. This power, as likewise that of the second period, is furnished by the Rhone.

At the southern end the narrow valley of the Diveria and its steep grade make an installation inconvenient, and both shores have to be utilized. Two working periods have to be considered. In the first year, during which the water power is being made obtainable, 180-horse-power is required for driving six hydraulic drills at 1,466 lbs. per sq. in. pressure, and 30-horse-power for ventilation. This is furnished by three transportable engines. In the second period, which lasts 4 to 4½

it is contemplated to introduce 1,760 cu. ft. air per second from the north ends. The north portal will be closed by a door. When both tunnels are used, air will be blown into tunnel I from the northern end, and into tunnel II from the southern end, while the north and south portals respectively of the two tunnels will be closed by doors. The air current will thus have the same direction as the trains.

Sanitary Arrangements.—As near to the tunnel portals as possible barracks will be built containing bathrooms, dressing rooms, laundry and restaurant. The working men receive from the contractors special working clothes, which, when not used, are kept in the barracks. The working clothes are returned after working hours to be cleaned and dried.

The Expert Report.—To examine and report on the Simplon tunnel project as described above, the Swiss government appointed a board of experts in April, 1894. This board consisted of Messrs. Francis Fox, of London; Karl Johann Wagner, of Vienna, formerly Division Engineer of the Arlberg Tunnel, and Giuseppe Colombo, professor in the Polytechnic School of Milan. Twelve



Sketch Map of the Line of the Simplon Tunnel and Approaches.

The double line following generally the valleys is the existing road over the Pass.

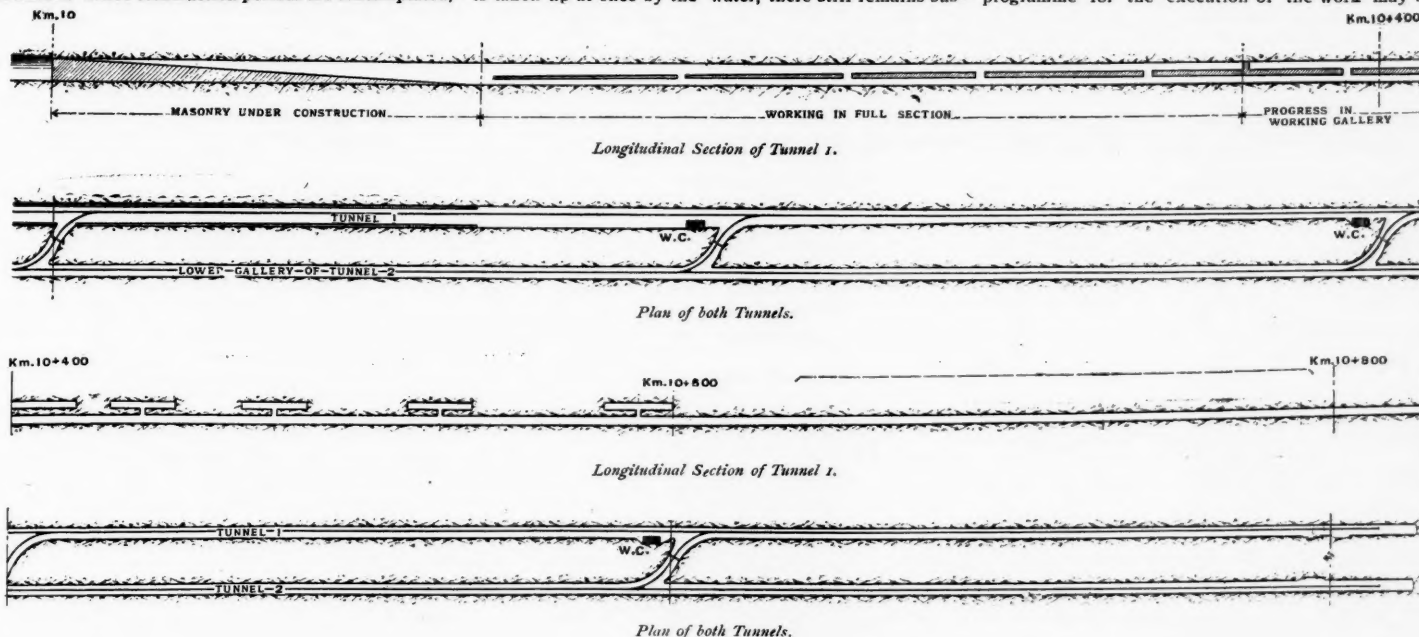
verse gallery. The water cools the air simultaneously. In equal manner the top galleries of tunnel I are ventilated from the lower gallery I. A calculation of the heat, which has to be drawn from the rock in order to lower its temperature to 58°, shows that 12½ gallons per second are necessary, if the cooling influence of the ventilating air is disregarded; 17½ gallons per second are provided, and it may consequently be regarded as safe that the temperature in the middle of the tunnel will never be unbearable. The 10-in. pipe line which carries water into the tunnel, is laid in gallery II. At the last temporary cross gallery, one branch carries the water forward for the hydraulic handling of the debris, another branch passes through the cross gallery and is divided into two arms, of which one goes forward for hydraulic, the other backward for cooling purposes.

Power Installation at the Tunnel Entrances.—At the north end the installation will be placed on the left shore of the Rhone. Three construction periods are contemplated,

years, there is needed, 350-horse-power for 10 drills with 14-10 qts. per second at 1,760 lbs. per sq. in.; 550-horse-power for cooling purposes and hydraulic removal of debris; 500-horse-power for ventilation; 200-horse-power for electric lighting; 100-horse-power for workshops, etc.; a total of 1,700-horse-power, which will be taken either from the Diveria or from the Cairasca.

The Ventilation During Operation of Tunnel.—In single track tunnels of the length of the Simplon tunnels, reliance cannot be placed on the change of atmospheric pressure, alone, by which the existing tunnels are ventilated by creating sufficient air currents. On some days the natural ventilation may be perfectly quiescent, and the air in the tunnel will be injuriously vitiated by the accumulation of smoke. In the Gotthard tunnel, the air is said to remain practically motionless for 12 hours of the day, during which a great amount of carbonic acid is delivered into this stationary atmosphere; while a great part of it is taken up at once by the water, there still remains sus-

questions were put to them, relating mainly to the construction, ventilation and operation of the tunnel. The Board submitted their report in July. They report favorably on the possibility of obtaining sufficient water power from the numerous brooks and rivers, especially as the low elevation of the tunnel gives them a great head of water. Regarding the installation, it is considered as desirable that the daily progress be increased beyond the proposed rate during the second period of construction, in order not to rush too much the remainder of the gallery work. They recommend that the distance of the tunnel walls from the axis be made at least 7 ft. 8½ in., so as to afford more standing room to employees during the passing of trains. The distance of 56 ft. between tunnel centers is believed sufficient, as the rock is stratified nearly vertically to the tunnel axis. With the exercise of care it is therefore not to be feared that the parallel cavities to be created will influence each other unfavorably. The programme for the execution of the work may be fol-



General Scheme of Progress in the Two Tunnels.

The normal rate of progress is intended to be 105 feet a week in both lower galleries, and 10 ft. 6 in. at each heading in upper gallery of tunnel I.

in the mechanical installations. In the first period of one year, during which the water power will be procured and the building erected, 140 horse-power will be required for driving six hydraulic drills at 1,026 lbs. per sq. in. pressure, and 30-horse-power for ventilation. This power will be furnished by three transportable engines. The second period will last 1½ to 2 years and

ended in the air enough to render it harmful for breathing. Further, the corrosion of metal work is very rapid. In the Arlberg tunnel the metal structure had to be renewed entirely after ten years. For these reasons it is proposed to ventilate the Simplon tunnel artificially. The same ventilators are to be used which will serve during construction. As long as only tunnel I is in operation,

lowed almost without alteration. For such long tunnels hydraulic transmission of power must at present be given preference, decidedly as the losses are smaller than with other systems, and as a maximum effect of machine drilling in the hardest Simplon gneiss is obtainable.

From the experiences in the Arlberg tunnel the Brandt system of revolving drills with hydraulic

transmission, is preferable to all other systems. The Board does not consider as feasible that the locomotives in transporting construction trains through Gallery II. can make the trip of about six miles without renewing the steam pressure by firing. In order not to vitiate the entering ventilating current in Gallery II. by the locomotive gases, it is recommended to switch the locomotives temporarily through the transverse galleries into Tunnel I., where the firing can be done. The proposed methods of ventilation were approved in the principal features. The question whether the operation of a single-track tunnel with parallel gallery and artificial ventilation is feasible, is answered in the affirmative, provided that the parallel gallery and the transverse galleries are lined with masonry wherever the nature of the rock requires, so as to exclude an interruption of the ventilation by a cave-in; it is further necessary that the locomotives attain a perfect combustion. As the capacity of one single-track tunnel under the circumstances, the experts give an average of 12 passenger and of 30 freight trains a day. The report recommends electric propulsion of the locomotives for the operation of the tunnel, as the vitiation of the air and the rapid corrosion of the track material would be obviated. The existing water power at both ends of the tunnel would render the conditions for an electric installation very favorable.

In conclusion the experts state that with the observance of care and precaution, the construction as well as the operation of the Simplon tunnel, will not offer particular difficulties.

The Locomotive Tests.

At the last convention of the Master Mechanics' Association, a committee was appointed to outline a series of tests of locomotives at Purdue University; also a committee was appointed to confer with the American Railway Association with regard to getting aid from that association in carrying out the tests. At the last meeting of the American Railway Association in this city the conference committee appeared and presented the report of the test committee and made an argument before the association, the result of which was that the American Railway Association will not at present give direct aid, as an association, to the carrying out of these tests. All of this is a matter of history, but we repeat it in order to bring up the subject again, and to say that an effort will be made to get subscriptions from the railroad companies to enable the Master Mechanics' Committee to carry out the proposed tests, and that it is quite possible that at least one railroad company will put up an independent plant, mounting a locomotive, and carrying on tests on the lines already begun at Purdue. We give below a few extracts from the report of the test committee to the conference committee.

The advantages of shop testing may be summarized as follows:

- It insures constant conditions.
- The whole plant is readily accessible while engine is in motion, thus affording exceptional opportunities for investigating the action of the mechanism when under speed.
- It permits the application of accessory apparatus of every sort.
- All gages and measuring instruments may be most conveniently located for accurate observations.
- It is comparatively inexpensive, considering the larger number of trips required under the variable conditions of regular service to get fair average results.

1. It is proposed to make a thorough test of the 17x24 inch simple engine now fitted up at Purdue, and then convert it into an equivalent two-cylinder compound and test, under similar conditions as before, and obtain the difference in the economy of the same locomotive when working with single expansion and with double expansion. This locomotive fairly represents the medium sized passenger engine in general use in the United States to-day.

2. To obtain the economy of a larger locomotive, the committee recommends a test of a large ten-wheel locomotive with 20x24-inch cylinders, and boiler and fire box large in proportion. The effect of the large boiler and grate upon the steam economy would be shown, and, incidentally, the friction of the additional wheels and heavier bearings would be measured. This engine would be tested and then converted into an equivalent two-cylinder compound, and the difference in the economy of its performance, when simple and compound, would be shown.

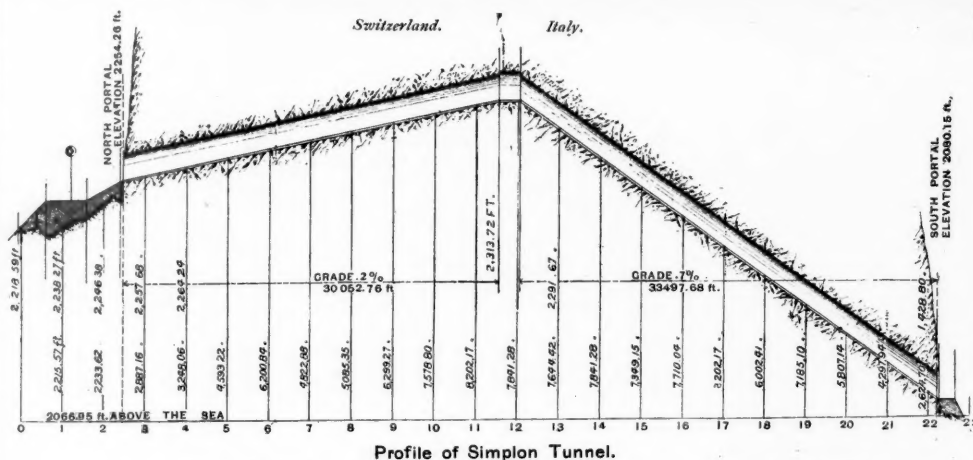
3. The tests by the 17x24-inch engine will be known as the "First Series," those with the 20x24-inch engine as the "Second Series." Each series of tests will be made with various speeds, boiler pressure and loads, but in each separate run constant conditions will be maintained.

4. It is thought that the most economical and efficient plan of operation will be to organize a small corps of operators, train them to do the work and proceed with the tests as rapidly and regularly as possible. The practice would be to make three tests per week, each test making a run equal to 100 miles.

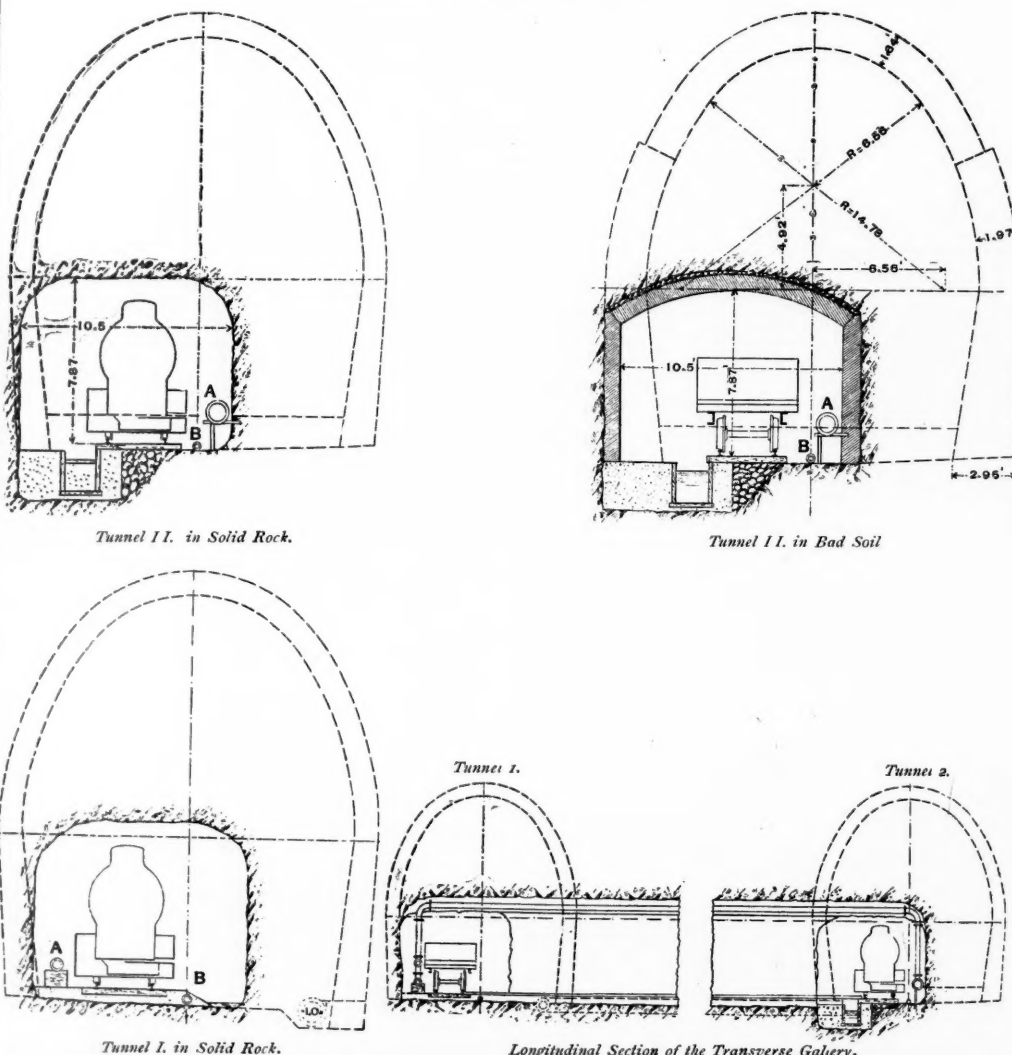
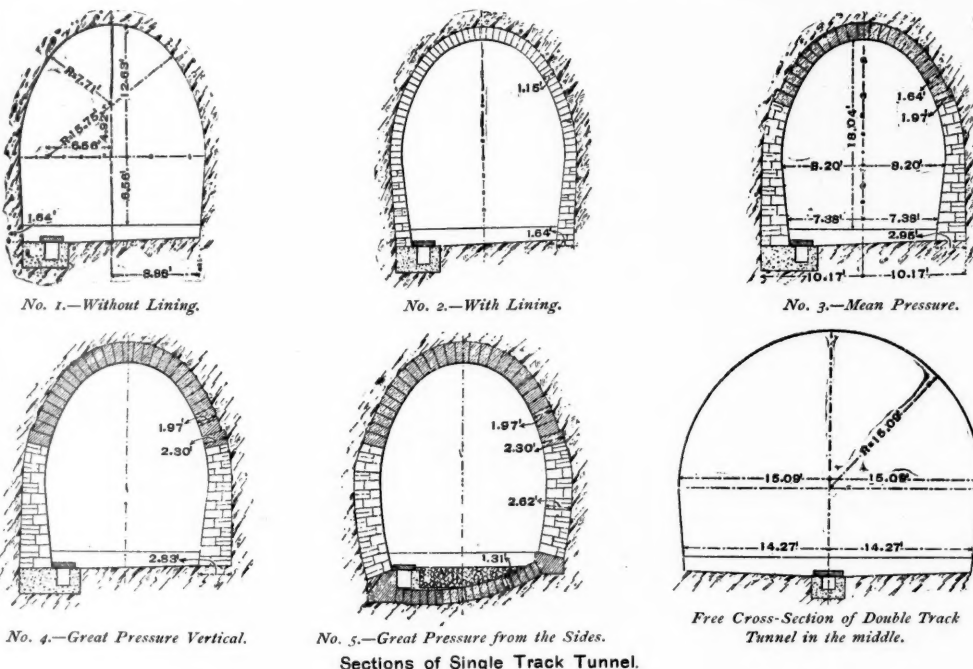
5. It is expected that on this plant the "First Series" of tests will occupy the four months, November to February, inclusive, and the "Second Series," should be conducted during March, April and May, 1895, and the report on each series finished in time to present to the Master Mechanics' convention in June, 1895.

We regard the work thus outlined for the first year, as only the beginning of a new and important branch of investigation which American railroads should conduct on locomotive testing plants. We expect that the work once commenced, and the fundamental data obtained, the future experiments would deal more with details. A number of tests of locomotive details by the shop method are suggested in a paper by Mr. George Gibbs, before the Western Railway Club.

It is obviously impossible for the committee, as a whole, or for individual members of the same to personally attend each test as it is run. It is expected, therefore, that while the committee will meet frequently and plan all the tests, the actual conduct of the work will be left largely to Professor Goss, who, as Director of the Purdue Laboratory, will properly be in immediate charge,



The lower set of figures of altitudes show the level of the ground; the others show the height of rail.



Tunnel I. in Solid Rock.

Longitudinal Section of the Transverse Gallery.

Sections of Working Galleries.

A—Power pipe for cooling and for handling material; 10" diam., B—Power pipe for hydraulic drills; 4" diam.

and he will be the committee's representative. The committee will, however, make frequent visits to the laboratory to inspect the course of the work, and to satisfy itself as to the methods followed.

To sum up in brief, we have outlined two series of tests which should show with greater accuracy than any heretofore made:

1. The relative economy of simple and compound locomotives under conditions similar to passenger and freight service.

2. The effect on economy of high steam pressure with simple and compound locomotives.

3. The effect of speed and load on economy of simple and compound locomotives.

We estimate that the expenses for the tests thus outlined, and conducted from November, 1894, to June, 1895, inclusive, will be \$7,460.00.

We would expect the railroad companies to provide the use of a large ten-wheel locomotive of modern design for four months, from March to June, 1895, with permission to convert it into an equivalent two-cylinder compound, but to return it to its original condition.

Air Brake Defect Card.

The Chicago, Burlington & Quincy Railroad Company has taken up the care of defective air-brakes in a way that gives some practical relief from delays due to defective brakes. It is another of the series of important steps which Mr. Rhodes has taken in the direction of reducing the cost of the maintenance of air-brakes on freight trains. The plan is shown by the card with this, it is called an "Air-Brake Cut Out Card." The card is printed on both sides, one for cases where the defect is such that the train pipes sound after the brake is cut out, so that it is safe to put the car between other air-

moles, breakwaters, and lighthouses; and in the navigation by artificial power for the purposes of commerce.

"Besides these great objects of individual and national interest, it is applied to the protection of property where natural powers are the sources of injury, as by embankments for the defence of tracts of country from the encroachments of the sea, or the overflowing of rivers; it also directs the means of applying streams and rivers to use, either as powers to work machines, or as supplies for the use of cities and towns, or for irrigation; as well as the means of removing noxious accumulations, as by the drainage of towns and districts to prevent the formation of malaria, and secure the public health. This is, however, only a brief sketch of the objects of civil engineering, the real extent to which it may be applied is limited only by the progress of science; its scope and utility will be increased with every discovery in philosophy, and its resources with every invention in mechanical or chemical art, since its bounds are unlimited, and equally so must be the researches of its professors.

"The enterprising Hollanders toward the close of the sixteenth century first separated civil engineering from architecture, under the title of hydraulic architecture; their example was followed in France towards the end of the seventeenth century, and soon afterwards was systematized in the great work of Belidor on 'Hydraulic Architecture.'

"One of the great bases on which the practice of civil engineering is founded is the science of hydraulics; every kingdom, every province, every town has its wants, which call for more or less acquaintance with this science. Water, which is at once the most useful of the necessities of life, and the most dangerous element in excess, when limited by the laws of this science is rendered the best of servants; the rolling cataract which spends its powers in idleness may be directed to drain the mine, to break the ore, or be employed in other works of labor for the use of man; the streams are collected and confined in canals for inland traffic; harbors are formed to still the raging of the waves of the ocean, and offer a safe retreat to the storm-driven mariner; and ports are provided with

a depression between two hills of marble. This change, though materially shortening the available dock room, is beneficial, as the shorter and more direct route will enable the scour of the tides to more effectually remove sewage from the canal. As Dykman's Meadow was narrower than the canal, and bounded by quite steep banks, the width of excavation was there reduced to 350 ft. to save rock work, and the depth there was increased to 18 ft. at mean low water. There is also another contraction in the channel, north of High Bridge, where the excavators of a large estate succeeded in having the width reduced to 375 ft.

There are now, either built or in the course of construction, 10 bridges over this waterway, viz.: Second avenue, railroad; Third avenue, highway; Fourth avenue, railroad; Madison avenue and McComb's Dam bridges, highway; the New York & Northern railroad. All of these are swing bridges of various designs with piers in the center. High Bridge and Washington Bridge are fixed. The first, though the spans are 77.7 ft. in the clear, only gives a clear waterway of 55 ft. The Washington Bridge is a two-arched iron bridge with clear spans of 510 ft. each, only one of which spans the waterway. The clear height is 136.7 ft. above mean high water. This is a highway bridge, and High Bridge in addition to carrying the old Croton aqueduct, serves as a foot bridge. North of the Washington Bridge is the new King's Bridge, a swing, steel, highway bridge, and at the mouth of Spuyten Duyvil Creek is the "jack knife" draw of the Hudson River Railroad. In addition to the above are the old King's Bridge and the Farmers' Bridge, wooden structures, neither of which is over the new

C. B. & Q. R. R.

AIR BRAKE CUT OUT.

Car can be placed between Air Brake Cars

Car No. 10,105 Initials C. V. Date 11-10

Card Applied at Chicago for following

Defects Leak in valve

By T. Jones Inspector By Marshall Conductor

NOTE—When air brakes are defective and repairs cannot be made, Inspectors or Conductors will tack one card properly filled out on each side of the car where it can be clearly seen. Train No. 40

brake cars; the other is for use where the defect in the train pipe or connection is such as to interfere with the use of the train pipe.

These cars are now used at all inspection points on the Burlington road. They are put in the hands of the inspectors and whenever a train goes through an inspection point all the cars with the brakes cut out are labeled with one of these cards and at the next repair point the repairs are made. The note at the bottom gives instructions for using the cards.

These cards being signed by the conductor and inspector and by the one who makes the repairs they are pretty sure to be correct. The Master Mechanics have instructions to forward all these cards to the office of the Superintendent of Motive Power, where they are then listed and in this way the principal causes of defects are determined. This furnishes a basis for improvement both in carrying out repairs and in preventing defects. In these days of seeking for a reduction of expenses the maintenance of air-brakes, so that they can be used to control trains and permit faster running, is highly desirable, and it is just such practical records as these cards that save telegrams, correspondence and delays on the road.

The Civil Engineer.

The best definition of civil engineering that has ever been made was written by Thomas Tredgold in 1827. "Civil engineering is the art of directing the great sources of power in nature for the use and convenience of man." *Engineering* (London) has recently published the old document in which this definition is first laid down. The statement is that it is almost always ascribed to Thomas Telford, the founder of the Institution of Civil Engineers, owing to the juxtaposition of this sentence and his name in the charter of the Institution. It appears that Mr. Tredgold was asked by the Council of the Institution to define the objects of the Institution of Civil Engineers and to give a description of what a civil engineer is, and the following is the communication which he wrote in response:

"Civil engineering is the art of directing the great sources of power in Nature for the use and convenience of man; being that practical application of the most important principles of natural philosophy which has, in a considerable degree, realized the anticipations of Bacon, and changed the aspect and state of affairs in the whole world. The most important object of civil engineering is to improve the means of production and of traffic in States, both for external and internal trade. It is applied in the construction and management of roads, bridges, railroads, aqueducts, canals, river navigation, docks, and store-houses, for the convenience of internal intercourse and exchange; and in the construction of ports, harbors,

docks, to receive the riches of the world in security, hence arose the term hydraulic architecture; but it was too limited; the various applications of water had rendered the natural supplies inadequate to the wants of man, till he discovered that, combined with heat it formed a gaseous element endowed with energies not less powerful than the falling cataract; its steam, confined and directed by science, became a new source of power, which in a few years altered and improved the condition of Britain, and we are every day witnessing new applications, as well as the extension of the older ones to every part of the globe."

The Harlem River Canal.

This improvement of and addition to the shipping facilities of New York City will be shortly open to traffic from the Hudson River at Spuyten Duyvil through the Harlem, to connect with Long Island Sound and the East River. As the improved channel is eight miles long it will add 16 miles to the dock front of the city, much of which was not before available.

This can hardly be described as a new water-course. It was used for navigation up to 1814 and in 1700, when the first bridge was built over it, near the present King's Bridge, Frederick Phillipse, of the Manor of Yonkers, built it with a draw. About the first of this century this channel was narrowed at King's Bridge and a tidal grist mill was built there, but through navigation was not suspended until McComb's dam was built, near the bridge of the same name, in 1813.

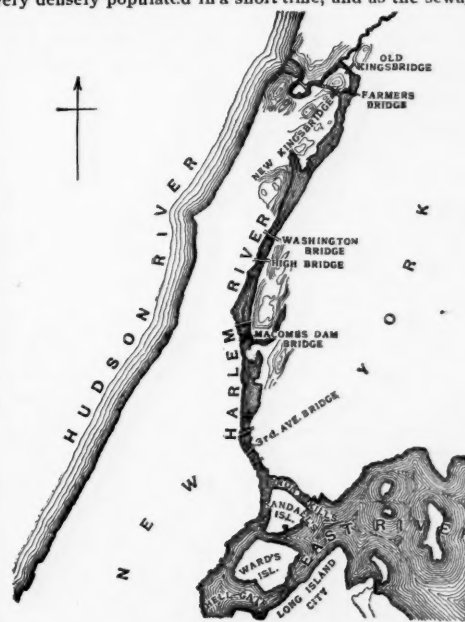
It was then proposed to take the Croton aqueduct across the Harlem Valley by a combination of a dam and an inverted syphon, but this was averted by the enactment of a law in 1839 calling for a bridge with at least 80 ft. between the intrados and the water. We are indebted to this law for the stately and beautiful High Bridge, with arches of 77.7 ft. span and 100 ft. in the clear above high water.

The efforts to recover this lost channel began as early as 1827, when the Harlem River Canal Co. was chartered, and the last company, which was chartered in 1863, retained a corporate life for nearly 10 years. The River and Harbor act of 1873, directing a survey, marks the first connection of the general government with the scheme; but it was not until 1879 that an appropriation for the work was made and that was conditional on the United States getting the right of way free of cost. This was not secured until July 10, 1886. The work has proceeded since as all government works do for which there is not a continuous appropriation.

As finally decided on, the canal is 400 ft. wide and 15 ft. deep. The natural course by old King's Bridge has been abandoned for a cut through what was Dykman's Meadow

channel. A bridge at First avenue is also to be built. In fact if we bridge the Harlem as often as the Seine at Paris is bridged in the same distance there will be 25 bridges over it. The War Department regulations for bridges and tunnels over and under the river are: All bridges shall be 24 ft. in the clear above high water at spring tides, and the draw spans of such width and length as shall be determined by the Secretary of War. All tunnels shall have their tops at least 20 ft. below mean low water. There are also provisions about the time during which the draws may be closed, giving the railroad and street traffic precedence over the river traffic.

The ground sloping towards the Harlem River will be very densely populated in a short time, and as the sewage



The Harlem River Canal.

The cut-offs are shown at the north end; that through Dykman's Meadow is crossed by the new King's Bridge.

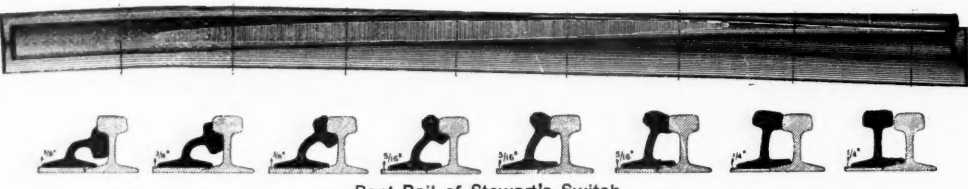
of a large area must be poured into a shallow and narrow cut the question of its clearance from the river at every tide, so that the Harlem shall not become like the Thames below Barking, is an important one. The range of tides varies from 5.5 ft. at the Third avenue bridge to

6 ft. at the Harlem end of Dykman's Meadow, and 3.9 ft. at the mouth of Spuyten Duyvil Creek. This will make the mouth of the canal at the Hudson River. But it is not at all certain that the tide will run through before it is met by a new tide from the Hudson. It is proposed to widen the Bronx Kill to 300 ft. It may be advisable to make this channel of greater width than a larger body of water may enter at the Harlem end. The estimated cost of the work, to the Government, is \$2,700,000.

Now some of the residents of the city most benefited by this canal propose to have a three days' celebration of the opening of the canal during the month of May next, in which canal boats, guns, flags and music will be largely in evidence. The canal will not be completed to its full depth of fifteen ft. at that time, but it is expected that a depth of eight ft. will be available.

The Stewart Bent-Rail Switch.

The engravings show a form of split switch which is a radical departure in the way in which the movable points are formed. It is not a mere paper plan, for the switch was patented in 1889, and some 10 or 12 sets of points made on this principle have been in use for a number of years on the Illinois Central and the Rock Island. We have seen letters from several officers of those roads speaking very well of the arrangement, the only criticism that they make being that it will probably be expensive to manufacture. The reply to that is that the American Railway Maintenance Syndicate, which owns the patents on this switch, is now having special machinery made for twisting the rail and for milling the groove in the head after twisting, and it is believed that these points can be made cheaper than the ordinary split



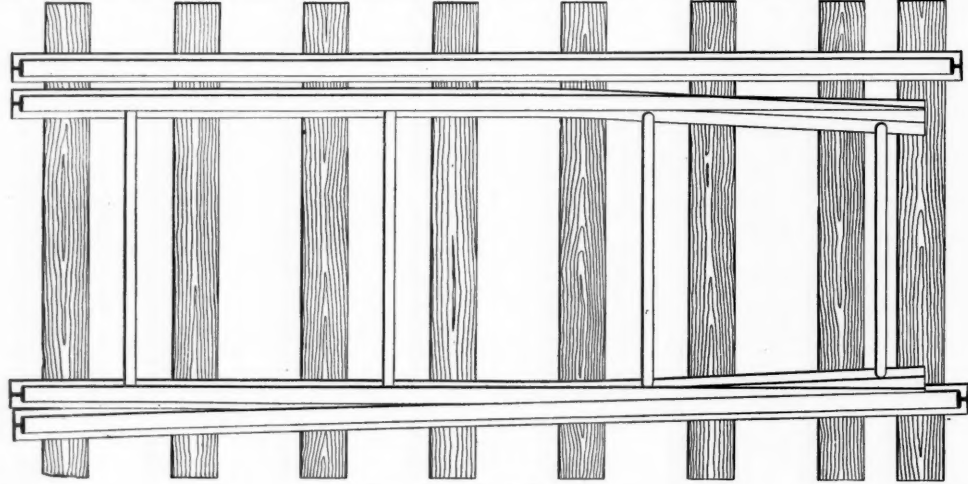
Bent Rail of Stewart's Switch.

switch rail when this machinery is in operation. The drawings show the arrangement clearly, and a full size switch can be seen at the offices of the Syndicate, 143 Liberty street, New York City.

The object of the method is to avoid cutting away and weakening of the switch-rails. The switch-rails are first twisted so that the side of the head at the movable end of each switch-rail will be on top and at that point the head is at right angles with its position at the other end.

The point of the switch-rail is raised by a plate of sufficient thickness to allow its flange to ride over the flange of the main rail and also to allow the ball of the switch-rail to rest against the web of the main rail and by milling away a very small portion of the head of the switch-rail it is allowed to fit in closely to the head of the main rail.

The second position shown in the engravings is a section one foot from the point of the switch; this shows the



Stewart's Bent-Rail Switch.

gradual rise of the head of the switch-rail and also shows the flange of the switch-rail overlapping the flange of the main rail one-eighth of an inch more than at the point. The third section, 2 ft. from the point of the switch, shows a still further rise of the head of the switch-rail and its flange overlapping the flange of the main rail one-eighth of an inch more than in the second position. At this point the head of the switch-rail begins to rise above the main rail. The other sections shown are a foot apart, and show the gradual rise of the switch-rail as well as the gradual creeping of its flange up on the flange of the main rail and towards the web of the main rail. The eighth position is a section 6 ft. 8 in. from the point of the switch. It will be observed that the switch-rail has reached a normal position, and the flange of the switch-rail is in close conjunction with the web of the main rail.

It will also be observed that from the third to the eighth position shown on the drawings the flange of the

switch-rail gradually rises and is made to conform with its position on the flange of the main rail; the metal in this case is not planed off.

The Stewart switch can be used in all interlocking systems and in any place where a split switch is used; and it is claimed that it will be found much more substantial and enduring than the split switch.

The Chicago Main Drainage Canal.

The annual report says that the entire length of the deep cutting, 28 miles, is under contract, and up to December 1, 1894, more than 40 per cent. of the excavation has been completed. It is claimed that the channel can be entirely excavated in 1896, and by the end of 1895 most of the rock sections will be finished.

The estimates made call for payments of \$18,500,000, and up to November 1, \$6,079,260 had been paid for construction. In addition to this, 6,284 acres have been acquired, and it is proposed to take 500 acres more. Of this, 1,480 acres are required for the canal, river diversions, levees, highway crossings, etc., leaving approximately 5,200 acres for dock property and other business purposes. The land account amounts to \$2,405,335, and the total expenditures have been \$10,193,131, of which \$570,720 is debited to the engineering department. The number of employees in this department is at present 142.

This canal, as is generally known, was designed not only as a channel for Chicago sewerage, but as a link in a great navigable waterway connecting the lakes with the Mississippi Valley and the Gulf of Mexico. The plan for the channel from Lockport to the head of Lake Joliet, seven miles, is now under consideration, and may be made merely a tail race or a continuation of the canal. From

Lake Joliet to Utica, below which place the grade of the Illinois River is virtually flat, and from Utica to the junction with the Mississippi, 230 miles, it is proposed to ask the general government to improve the channel. Mr. Cooley is arguing that the extension to Lake Joliet should be made a navigable channel, and that 60,000-horse-power should be developed, and that all the bridges over the channel should be made swing bridges, as navigation will not be developed by an unnavigable channel. The President of the Board of Trustees does not commit himself as to the size of the waterway below Lockport, but advocates fixed bridges until such time as constructing the channel down the river is undertaken.

Brakes on the Truck Wheels of a Locomotive.*

On the 9th and 16th of April, 1893, some experiments were made upon the effect of employing brakes upon the

truck wheels of a locomotive. The trains drawn were composed of different numbers of cars, and were run at speeds corresponding, as nearly as possible, with those found in express train service. The locomotive employed was No 299 of the Old Colony Railroad, the following being some of its principal dimensions:

Number of drivers.....	4
Diameter of drivers.....	66 in.
Cylinders.....	18 in. x 24 in.
Weight on drivers.....	63,000 lbs.
Weight on truck.....	35,000 "
Total weight of engine.....	98,000 "
Weight of tender loaded.....	64,000 "

The cars used were 50 feet passenger cars, having an average weight of 43,000 lbs.

The objects of the experiments were to determine (1) the distance in which the train could be stopped with the truck brakes applied, as compared with that in which it

*A paper by Prof. Gaetano Lauza, presented at the New York meeting (December, 1894) of the American Society of Mechanical Engineers.

could be stopped when the truck brakes were not applied, every wheel in the train having brakes acting on it. (2) The distance in which the train could be stopped with all brakes applied, the throttle being closed, as compared with that in which it could be stopped when all brakes were applied and the throttle was left open.

This part of the road is perfectly straight, and has an ascending grade of only 0.22 per cent.

The observations taken were: (1) Speed, just before the application of the brakes. (2) Length of stop. (3) Train pipe pressure, just before the application. (4) Time of stop. The speed was determined by averaging the results obtained from the readings of two revolution counters, one of which was connected with the cross-head, and hence gave the number of revolutions of the drivers, while the other showed the number of revolutions of the truck wheels.

In the following comparative table a selection has been made of tests in which the speed was quite near sixty or forty-five miles per hour, and the equivalent length of stop with a train pressure of 70 lbs., and the two above-stated speeds, respectively, were calculated in each case.

Number of Stop.	Speed per Hour. Miles.	Number of Cars.	Truck Brake. In or Out.	Length of Reduced Stop. Feet.	Average Length. Feet.	Gain in Feet.	Gain in per cent.
8	60	None	In	1,699			
9	60	"	"	1,705	1,657		
10	60	"	Out	2,166			
11	60	"	"	2,132	2,149	492	23
4	45	"	In	1,052			
5	45	"	"	990			
6	45	"	"	973	1,005		
1	45	"	Out	1,301			
2	45	"	"	1,282	1,292	287	22
16	60	One	In	1,398			
17	60	"	"	1,487	1,443		
18	60	"	Out	1,721			
19	60	"	"	1,689	1,705	262	15
14	45	"	In	821			
15	45	"	"	889	855		
12	45	"	Out	936			
13	45	"	"	988	962	107	11
25	60	Two	In	1,242	1,242		
22	60	"	Out	1,381	1,381	139	10
26	45	"	In	850	850		
29	45	"	Out	940	940	90	10
34	60	Three	In	1,263	1,263		
32	60	"	Out	1,314	1,314	111	8
49	60	Four	In	1,411			
50	60	"	"	1,452	1,432		
47	60	"	Out	1,593			
48	60	"	"	1,493	1,543	111	7
43	45	"	In	828			
44	45	"	"	808	818		
45	45	"	"	836			
46	45	"	Out	885	861	43	5
52	45	Five	In	705	705		
53	45	"	Out	768			
54	45	"	"	706	737	32	4
59	60	Six	In	1,180			
61	60	"	"	1,253	1,217		
62	60	"	Out	1,256			
63	60	"	"	1,246	1,251	34	3
57	45	"	In	737			
58	45	"	"	744	741		
55	45	"	Out	783			
56	45	"	"	776	780	39	5

This comparative table speaks so plainly for itself that it seems unnecessary to comment upon it at any length. That the percentage gain, as well as the gain in feet, should be greater with short than with long trains, was naturally to be expected. The following table exhibits the difference in the length of stop with and without the throttle valve closed.

Number of Stop.	Speed per Hour. Miles.	Number of Cars.	Truck Brake. In or Out.	Length of Reduced Stop with Steam.	Average Length with Steam.	Length of Stops, Similar Conditions, Without Steam.	Difference
41	45	Four	In	1,037			
42	45	"	"	1,029	1,033	818	215
51	60	"	"	1,679	1,679	1,432	247
64	45	Six	"	851			
65	45	"	"	800	826	741	85

Train Accidents in the United States in November. COLLISIONS.

REAR.
1st, 11 p. m., on Louisville & Nashville, at Springfield, Tenn., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, wrecking several cars. A tramp was killed.
2d, on Baltimore & Ohio, at Rankin, Pa., a passenger train ran into the rear of a preceding freight, doing considerable damage. The engineer was killed. The rear brakeman of the freight was held for trial on a charge of manslaughter. It is said that he went back with a red lantern, but claims to have fallen down and broken it.
2d, on Pittsburg, Fort Wayne & Chicago, at South Chicago, Ill., a passenger train ran into a freight train, badly damaging the engine. Three trainmen were injured.
21st, on Manhattan Elevated, at 131st street and 8th avenue, New York City, an express train ran into the rear of a preceding empty train, damaging the engine and one car. The fireman, who jumped off upon the platform at the side of the track, fell against the wheels and was injured. *There was a dense fog at the time.
24th, on Southern Railway, at Woodlawn, Ala., a freight train descending a grade broke in two and the rear por-

tion afterward ran into the forward one, wrecking 6 cars. A brakeman was injured.

28th, on Lehigh Valley, near Pittston Junction, Pa., a milk train ran into the rear of a preceding freight train, wrecking the caboose and 3 loaded cars. The fireman was injured. It is said that the collision was due to a misplaced switch.

30th, on Louisville & Nashville, near Helena, Ala., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one. The collision occurred on a bridge over the Cahaba River and 6 cars and the caboose fell into the stream; conductor and one brakeman fatally injured.

30th, 7 a. m., at St. Paul, Minn., a freight train of the Chicago Great Western ran into the rear of a freight train of the Minneapolis & St. Louis, wrecking several cars. A brakeman was injured. There was a dense fog at the time.

And 16 others on 14 roads, involving 5 passenger and 21 freight and other trains.

BUTTING.

7th, on Houston & Texas Central, at Manor, Tex., a freight train ran over a misplaced switch and into the head of a work train standing on the side track, damaging both engines and several cars.

7th, on Baltimore & Ohio, at Rosensteel, Pa., butting collision between passenger train No. 5 and freight train No. 64, making a bad wreck, in which both engineers, one fireman, one brakeman, and 2 mail clerks were killed and 3 trainmen were injured. Both trains were running at high speed and met on a curve, but the passenger cars were not damaged, being fitted with vestibules. The conductor and engineer of the passenger train forgot a schedule meeting point, and the freight had the superior right to the road.

12th, on Kansas City, St. Joseph & Council Bluffs, near Parkville, Mo., butting collision of freight trains, wrecking both engines and several cars. A man riding in a car of emigrant movables was injured. It is said that the northbound train assumed that the southbound had arrived at Kansas City without looking at the register.

13th, 5 a. m., on Atchison, Topeka & Santa Fé, near Crawford, Tex., butting collision between a passenger train and a freight, both running at good speed. The front portions of both trains were badly wrecked, the cars in front being crushed sufficiently to break the shock, so that the passengers were not much injured. The express train had just passed over a long and high bridge. Three trainmen were injured. It is said that the freight train had disregarded a telegraphic order.

13th, on Great Northern, at Hancock, Minn., butting collision of freight trains; conductor injured.

17th, on Cleveland, Lorain & Wheeling, near Massillon, O., butting collision between a freight train and an empty engine, both running about 25 miles an hour. The freight engine was overturned and the engineer killed. One fireman was injured. A flagman had been instructed to hold the freight train at a certain point, but misunderstood his instructions.

18th, 3 a. m., on Lehigh Valley, near Tunkhannock, Pa., an eastbound freight train standing on the west-bound track was run into by a westbound freight, making a bad wreck; 2 trainmen injured. It is said that the flagman did not go out far enough.

20th, on Delaware & Hudson, near Albany, N. Y., butting collision of passenger trains, damaging both engines; 3 passengers slightly injured.

21st, on New York & New England, at Oxford, Mass., butting collision of passenger trains, doing considerable damage; 2 trainmen and 2 passengers injured. It is said that one of the trains approached the station at uncontrollable speed contrary to the rules.

29th, 5 a. m., on Texas & Pacific, near Marshall, Tex., butting collision between freight trains, one of which was at a standstill, wrecking both engines and 9 loaded cars. Three trainmen jumped off and were injured. It is said that one of the trains passed a meeting point wrongfully, assuming that a certain train on the side track was the one which ought to be met there, when in fact it was not.

And 6 others on 6 roads, involving one passenger train and 11 freight and other trains.

CROSSING AND MISCELLANEOUS.

9th, on Pennsylvania road at Philadelphia, a freight train collided with an engine standing on a side track, but foul of the main track, wrecking the cab. One engineer was injured.

13th, near Kansas City, Mo., a passenger train of the Chicago & Alton ran into a passenger train of the Belt Line, at the crossing of the two roads, doing considerable damage. One passenger was injured.

15th, on Philadelphia & Reading, at Philadelphia, a car which was being run upon a siding ran over a misplaced switch and struck a passenger train which was passing at the time, badly damaging a passenger car. A brakeman was injured.

21st, at Buffalo, N. Y., a freight train of the Lake Shore & Michigan Southern ran into a freight of the West Shore at the crossing of the two roads, wrecking a car and damaging an engine. A brakeman was injured.

21st, on Southern Pacific, at Houston, Tex., a string of freight cars being switched became uncontrollable and ran into passenger train, making a considerable wreck and setting fire to a car of oil. Fourteen cars were burned up.

24th, at St. Cloud, Minn., collision between a passenger train of the Northern Pacific and a freight train of the Great Northern; 3 trainmen were injured, one of them fatally.

24th, night, on Missouri, Kansas & Texas, near Caddo, I. T., the engineer of a freight train on suddenly coming in sight of a trestle which was afire, thought it would be dangerous to cross and jumped off, the rest of the men on the front portion of the train jumping also, and three of them were injured. The train crossed in safety, however, and the engine went forward 6 miles to stop a passenger train and to get assistance. On returning it collided with the standing cars of its own train, badly damaging several of them. The engineer was injured.

28th, 5 a. m., on Western New York & Pennsylvania at Springville, N. Y., a freight train running at high speed ran over a misplaced switch and into an engine standing on the side track, making a bad wreck. One engineer was killed.

29th, at Hartford, Conn., collision between a passenger train of the New York, New Haven & Hartford, Valley Division, and a switching engine of the New York & New England at the crossing of the two roads, overturning the switching engine and killing its engineer.

And 10 others on 10 roads, involving 3 passengers and 17 freight and other trains.

DEAILMENTS.

DEFECTS OF ROADWAY.

9th, on Chicago Great Western, near Rockford, Ill., a

freight train broke through a bridge which was under going repairs and the tender and 10 cars of coal were wrecked; fireman, one brakeman and a tramp injured.

28th, on Seaboard Air Line, at Greystone, N. C., the engine of a freight train was derailed by a broken frog and the tender was overturned. Twelve cars were ditched. The engineman was injured.

And 7 others on 7 roads, involving 2 passenger and 5 freight and other trains.

DEFECTS OF EQUIPMENT.

9th, on Lehigh Valley, near Avoca, Pa., a freight train was derailed by a broken wheel and 4 cars were wrecked. A brakeman was injured.

19th, on Pennsylvania road, at Larimer, Pa., a heavily loaded freight train was derailed by a broken axle and a number of cars fell through a trestle, making a very bad wreck. Eight miners riding home from their work fell with the cars and 5 of them were killed.

24th, on Kansas City, Osceola & Southern, near Clinton, Mo., a freight train was derailed by a broken truck and 7 cars were ditched. A brakeman and one passenger were injured.

And 17 others on 16 roads, involving 2 passenger and 15 freight and other trains.

NEGLIGENCE IN OPERATING.

8th, on Chicago & Northwestern, near Baraboo, Wis., a freight train was derailed at a place where the track was undergoing repairs and a flag had not been put up. The engine fell down a high bank and the engineer was injured.

11th, on Chicago & Northern Pacific, at 40th street, Chicago, a heavy excursion train was derailed at a misplaced switch and the engine and first car badly damaged. The engineer and several passengers were injured.

29th, on Chicago & Northwestern, at Palatine, Ill., a telegraph pole fell from a car in a freight train and caused the derailment of 8 cars. The pole penetrated the station building.

And 6 others on 6 roads, involving 2 passenger and 4 freight and other trains.

UNFORESEEN OBSTRUCTIONS.

2d, 2 a. m., on Southern Pacific, near Lake Charles, La., the engine and first two cars of a passenger train were derailed by a tree which had fallen upon the track. The fireman was injured.

12th, on International & Great Northern, near Keechi, Tex., a freight train was derailed by running over a cow and the engine was overturned; engineer and 2 other train men injured.

15th, 11 p. m., on Cincinnati, Hamilton & Dayton, at Connersville, Ind., a passenger train was derailed at a misplaced switch and the engine and baggage car were overturned. It is said that the switch had been maliciously misplaced, the lock being carried off and the light extinguished.

17th, on Southern Pacific, near Eunice, La., a passenger train was derailed at a switch which had been maliciously misplaced and the engine and first 2 cars overturned. The fireman was killed and the engineer fatally injured.

19th, on Chesapeake, Ohio & Southwestern, at Frazier, Tenn., a freight train was derailed by a misplaced switch, making a bad wreck. The fireman was killed and 2 other trainmen and 2 tramps were injured.

24th, on Union Pacific, near Sandy, Utah, a passenger train was derailed by running over a horse, wrecking the engine and baggage car. The fireman and one passenger were injured.

28th, on Texas & Pacific, at Hallsville, Tex., a passenger train was derailed by a spike lying on the rail; the engine was overturned and the fireman injured.

29th, on South Carolina & Georgia, near Kingville, S. C., a passenger train was derailed at a switch which had been maliciously misplaced and the engine was overturned. Some of the cars were overturned and took fire, from the fire-box of the engine; and the combustible portion of the whole train, 6 cars and engine, was burned up. The engineman was injured; but the passengers all escaped.

And 5 others on 5 roads, involving 5 freight and miscellaneous trains.

UNEXPLAINED.

12th, on New York, New Haven & Hartford, at Stonington, Conn., a freight train was derailed and 4 cars were wrecked. A brakeman was injured.

22d, on New York Central & Hudson River, near Unionville, N. Y., a passenger train was derailed and the engine overturned. The fireman was injured.

26th, on Chicago, Milwaukee & St. Paul, near Appleton, Wis., a freight car in a mixed train was derailed; 2 passengers injured.

27th, on Lancaster & Reading Narrow Gauge, near Ref-ton, Pa., a mixed train was derailed near a trestle and 4 freight cars fell down a high bank. A brakeman was injured.

30th, night, on Houston & Shreveport, near Shreveport, La., a freight train was derailed and 9 cars were ditched; a brakeman was killed and a tramp injured.

And 28 others on 25 roads, involving 4 passenger and 24 freight and other trains.

OTHER ACCIDENTS.

20th, on Chicago & South Side Elevated, at 26th street, Chicago, the water plug of the locomotive of a passenger train was blown out, filling the cab with steam and burning coal. The fireman jumped to the ground and his leg was broken.

And 2 others on 2 roads, involving one passenger train and one freight.

A summary will be found in another column.

Railroad Matters in New South Wales.

Mr. E. M. G. Eddy, for six years Chief Commissioner of Railways of the Colony of New South Wales, declines a reappointment to that office his term having expired. While his retirement will be a loss to the Colony it will probably be a gain to the mother country, for he will doubtless re-enter the railroad service in England. Indeed, there are already rumors of his appointment to important offices there, but none of them have yet been confirmed.

His term of office in New South Wales has been most arduous. He took hold of the colonial railroad system when its physical condition and its earnings had fallen to a low condition, and under his administration, and certainly to a considerable extent owing to his firmness and ability, conditions have greatly improved. In 1888 the

gross earnings of the railroads were £2,295,000, being nearly £600,000 more than they were in 1882. The net earnings, however, were but £764,573 about £900 more than in 1882. Since that time the net earnings have increased steadily, and in the year ending June 30, 1894, they were £1,221,699, the gross being £2,813,541; that is, while the gross had increased over 1888 only 22 per cent., the net had increased 60 per cent. The percentage of working expenses to gross revenue declined year by year, having been 66.69 in 1888 and 56.58 in 1894. Per mile of railroad opened the gross and net earnings in 1888 were £1,123 and £374 respectively. In 1894 they were £1,159 and £503. Both gross and net per mile were larger in several other years during Mr. Eddy's term, than they were in 1894, but it is a rather remarkable fact that they did not fall off with the increase of mileage (about 18 per cent.). The gains in net earnings were also made in the face of a steady decrease in the ton-mile rate which averaged 1.62 in the year ending Dec 31, 1893.

At the end of June, 1894, the miles open for traffic were 2,501, and of these 1,168 were worked under the absolute block system. In 1888 only 28 miles were so worked. The percentage of places in which the points and signals were not interlocked fell in the six years from 75.36 to 39.79.

Mr. Eddy has had the misfortune to have to do his work not only during a time of severe financial stress, but also amid a constant struggle with a hostile political element. The colonial railroads, being under Government control, offer a fine field for the activities of the professional politicians, who appear to be particularly vehement and energetic in that colony, and for one reason or another they have never spared the Commissioners in their attacks. Sometimes it has been merely to catch the labor vote; sometimes it has been to please the element which has been hostile to the introduction of American machinery and methods; and unfortunately these men have often been able to hamper seriously the work of the Commissioners. Indeed a Sydney newspaper recently received says: "To take one instance, Mr. Eddy is fitting every goods truck with the Westinghouse brake. But, incredible as it may seem, administrative fossils in this colony are not only declining to use the brake, but even where it has been fitted on trucks they are hauling it up and down the lines as useless lumber. The apparatus has been paid for, there it is, and yet it is not used. Mixed trains carrying passengers are commonly run without it." Such a statement merely suggests the forces against which an enlightened commissioner has to struggle in that Colony, and one cannot wonder that Mr. Eddy feels that after six years he has had enough of it.

Decimal Sheet Metal Gage.

The Norfolk & Western Railroad has taken a step in the right direction in casting aside the present confusing and annoying gages for sheet metal, wire, tubing, etc., and has started a decimal system which prevents discussion as to what a gage number means. Specification 10 B, issued by Mr. R. H. Soule, Superintendent of Motive Power, is for a gage for sheet metal, wire and tubing, and is as follows:

Sheet metal, wire and tubing (less than 1/4 in. in thickness), should always be ordered by expressing the thickness in decimals of an inch, in accordance with the following table, in which the figures in heavy type are decimals of an inch and are to be used in making requisitions; the figures in lighter type show the nearest thickness according to the Birmingham Gage, these light figures being given for convenience of reference only.

Inches.	Birmingham Gage.	Inches.	Birmingham Gage.	Inches.	Birmingham Gage.	Inches.	Birmingham Gage.
.002	.....	.022	24	.065	16	.125	11
.004	36	.028	22	.070	15	.135	10
.006	35	.032	21	.075	.....	.150	9
.008	33	.036	20	.080	14	.165	8
.010	31	.040	19	.085	.....	.180	7
.012	30	.045	.....	.090	.....	.200	6
.014	28	.050	18	.095	13	.220	5
.016	27	.055	17	.100	.....	.240	4
.018	26	.060	.....	.110	12	.250	3

These gages are made in the usual form of a disc by the Brown & Sharpe Mfg. Co., and Mr. Soule has made arrangements so that any one wishing them can purchase them direct from that company. It is understood that they are kept in stock. The large figures in the table give the dimensions of the notches in the gage and the small figures give the nearest Birmingham gage number.

The Atlanta Exposition Buildings.

The following were the lowest and successful bids for erecting the five main buildings for the Cotton States Exposition, to be held at Atlanta, Ga., in the last three months of 1895. The buildings are the machinery, manufacturers', electricity, agricultural and mineral and forestry buildings. The following were the successful bids: A. Wilson, Cincinnati, O., Manufacturers' building, for \$36,000; Machinery building, Atlanta Building Co., for \$29,700; Agricultural building, Grace & Hyde Co., Chicago, \$16,800; Electricity building, Gude & Walker, Atlanta, for \$12,000; Forestry and mining building, Atlanta Building Co., for \$11,231. The architect of these buildings is Mr. B. L. Gilbert, of New York. The award was made on the recommendation of Mr. Gilbert and Mr. Grant Wilkins, C. E., chairman of the Building Committee.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Engineers will be pleased to know from Senator Morgan that the cost of the Nicaragua canal includes very few uncertain factors. "I have shown," he says, "that the engineering is very simple, and that it includes only the common work of digging earth, of dredging under water, of blasting rock, of building dams and waterways, and of building canal locks and 'sea walls or breakwaters.' What, in heaven's name, is the uncommon work that engineers did to do? The Senator skips as airily through a cut three miles long and 300 feet deep, to be excavated through uncertain material, as if he were an Irishman with a contract for 100 rods of ditching in a meadow. And as for the great Ochoa dam, with its unprecedented difficulties, why that is merely building dams. We decline to believe that Congressmen will allow themselves to be beguiled by the statement that 'the canal leading from Liverpool to Manchester has far more extraordinary work on it than this canal, which indeed has none.'"

Last week we gave a general summary of two important papers on locomotive counterbalancing and the effect on the track, which were read before the American Society of Mechanical Engineers at its last meeting. Since then we have received the *Proceedings* of the Southern and Southwestern Railway Club, in which is given a report on the same subject by a committee of that club. This report is the most comprehensive published up to this time, and contains information about prevailing practice that is not to be found elsewhere. Later we shall give this report more in detail. The summary contains the following conclusions among others:

"For modern heavy, well-designed locomotives with comparatively light reciprocating parts, provide counterbalance for 50 per cent. of the reciprocating weight.

"For lighter engines that are less able to withstand strain, and absorb the disturbances caused by heavy reciprocating parts, or for such as have very short wheel base and long overhang, balance up to 60 per cent. of the reciprocating weight.

"For compound engines with large pistons and excessively heavy reciprocating parts balance up to 75 per cent. of the reciprocating parts.

"Make the reciprocating parts as light as possible." The gist of this is that the lighter the engine the less can be the weight of the reciprocating parts that are unbalanced and this is the point that was brought out in one of the papers before the Mechanical Engineers. This report does not treat particularly of the effect on the track, but emphasizes the necessity of reducing the reciprocating parts to the least possible amount, and to this end a number of drawings showing light forms of pistons are given.

Shoemakers and drygoods jobbers are not the only people who feel sure that their business will "go dead" if the freight classification is changed; the agricultural implement makers of Chicago complain to the Western Classification Committee that 75 per cent. of their sales will be lost if the freight rates are raised as proposed in a notice which has been issued to go into effect January 1. It is plain that the railroads will have to give longer notice

when they wish to make an advance on important commodities which are contracted for long in advance, and in which competition among manufacturers is sharp. (And to be fair to all parties, equally long notice should be given when a reduction is to be made.) It is true that such a course would offer a tempting opportunity to traffic managers who are fond of underhanded methods, for nothing gives more satisfaction to such a man than to cultivate favor with shippers by posing as one who will treat them more justly than the majority will; but there is no alternative. If long notice is not given, shippers will have a well founded grievance, and their ordinary grievances—partly unfounded—are bad enough. An item in the Chicago despatch to which we refer, illustrates what we said last week, that a change in classification generally produces more inequalities than it abates. The Chicago people who complain at an increase on harvesters, haystacks and such like things which require a whole car to carry two tons, find fault because the rates on stoves have not been raised. It seems to us that this is a good opportunity to give shippers a little of the theory which they themselves—or many of them—hold in such high esteem, the theory of charging according to cost of service. Ask them to figure out what should be the proper rate on hay tedders and threshing machines when it takes as much car room, and practically about the same amount of motive power, to transport 5 tons of those as to transport 30 tons of coal.

The Nicaragua Canal Again.

One or two esteemed readers have asked "Why do you do such an unpatriotic thing as to oppose the Nicaragua Canal?" This shows how carelessly even esteemed readers read. We have never opposed the Nicaragua canal. We are not certain that this ought not to be done in the interests of mankind at large. We are not certain that the canal would not be a huge economical mistake—a vast waste of human energy, stored in money, and active in labor, and any such waste adds to the difficulties against which mankind is always fighting. No one has ever shown, except by loose and entirely speculative estimates, that enough commerce would flow through the canal to pay working costs, maintenance and proper interest on the first cost. Painstaking and competent engineers have made plausible figures to show that such a volume of trade through the canal is improbable. But having in mind the difficulty of making reliable estimates of this nature, and the prodigious mistakes that have been made in other cases, (as for example that of the Suez canal, where the result proved its opponents wrong, and the Manchester canal where the result is proving its opponents right) having, we say, all these things in mind we have not opposed the Nicaragua canal.

Nor have we opposed financial aid to the canal enterprise by the United States Government, although patriotic citizens ought to oppose it. The notion that in some way it would be a great misfortune to have Englishmen build the canal seems to have taken a strong hold of a good many minds, and this branches out into the other notion that the United States as a nation should control the canal by actually putting their money into it. To us it seems obvious that the canal should be built if possible by private enterprise and not as a government work, or with government aid, for in that way only is it possible for those who are to get the greatest profit from the canal to take the financial risk and burden of its construction. In general terms it is doubtless true that it would be for the benefit of the whole nation to have a great waterway through the isthmus; but on the other hand, it is, in general terms, positively unjust that the wheat grower of Dakota or the cotton spinner of Massachusetts should pay for a canal which will be of only small and remote benefit to him but which will give the coal miner of Alabama a great, new market for his product. It may not be precisely just to say of this canal as Gen. Hancock said of the tariff, that it is "a local issue," but relatively it is; that is, it is of vastly more importance to the people of a few restricted regions in our country than it is to the very great majority of our citizens, and it is from among those people that the money to build it should come; or at least the burden rests upon them of persuading capitalists to furnish the money.

There is a very long list of projects of more or less local and more or less national importance which are now asking help from the United States Treasury, each one of which is of immensely more importance to the people of its locality than is the Nicaragua canal. It may be that legislation in favor of all of

these can be got through by the familiar process of log rolling; that is, that Chicago and the country immediately tributary to it, Seattle and the country behind it, Buffalo and New York, can all get government aid for the multitudinous schemes for ship canals by the tactics which have for years and years corrupted and perverted our whole system of river and harbor appropriations. Perhaps they can do this; and the next step would be national bankruptcy.

But concerning this whole question of national aid and national control, we shall not stop now to write. It is in itself a matter for an article or indeed a series of articles.

What we have opposed is the project for plunging the United States into this responsibility in ignorance of what it will lead to, and this opposition is not an unpatriotic but a patriotic act. It is so simple a matter to stop where we are, and to have the project investigated by competent and disinterested engineers, and that step would so effectively disarm the great body of critics of the present action of the friends of the canal, that we are amazed that the canal company itself does not urge this course. The obvious conclusion to which we are driven is that that company thinks it would be easier to unload its assets and liabilities on the United States Government now than after such a fair expert report was made.

The Standard Code, Part 3.*

One of the most important matters that came before the American Railway Association at the October meeting was the code of rules presented by the Committee on General Regulations for Employees. As this code is yet to be acted upon, its character and merits are, or should be, a live subject for discussion. This subject (like others which were up at the meeting) is one in which the question of the committee's opinion of its own work is at issue, but as a prominent committee of Congress has lately made a report on a subject concerning which the members of the committee do not know what they believe, we have a distinguished example to warrant the discussion of this code of employees' rules without regard to such little formalities.

This committee report consisted wholly of a code of rules (on matters which are not covered by the standard code as heretofore adopted) which the members had not thoroughly studied (the compilation and editing of the code having been done by a single expert and not by the committee) and which, therefore, they could not recommend. This attitude of the committee was, of course, objected to. To meet such objections the committee hopes to "digest" the code, or parts of it, and report again later. But it is at least an open question whether such digestion will do as much good as harm. It will take a prodigious amount of the committee's time, and at the best there must still be a considerable proportion of the work which will not be accepted by a majority of the members. This proportion will probably be larger than it was in the standard code, for the rules cover points which are not so well settled. Moreover, members would be more free to dispute these precepts in any event, because they are not so vitally essential to the safety of trains as are those of the standard code.

Assuming this to be so we may well lay aside the question of complete uniformity and look for a moment at the value of the committee's report as it now stands, that is, to the advantages already attained; (1) fullness, (2) clear language, (3) orderly arrangement. The first assures every superintendent that he need have no fear that anything important is left out. The compiler used everything from every important code, that was not local in its nature. No matter how much any one may object to this fullness he has only to erase what he does not want. A Pennsylvania man desiring to condense as severely as that road now does, would, indeed, have to do some re-writing, but we can hardly believe that the majority, will agree to the Pennsylvania standard of brevity. While fullness is a chief merit of this code, its merit, like that of the Standard Code of 1887, also consists largely in the absence of unnecessary fullness. It is only by assiduously comparing and re-writing for weeks at a time, that any one can thoroughly expunge all superfluous, meaningless and ambiguous

*The standard code of train rules, as adopted by the American Railway Association and now used by many railroads, consists of general and train rules numbered from 1 to 121 inclusive; and rules for the movement of trains by telegraphic orders numbered from 500 to 527, with 11 forms of orders following. As no short titles have been given to these divisions we have assumed, as making the most natural distinction, that the first series of rules ought to be called part one and the telegraph rules part two; and we therefore designate the rules now under discussion by the convention as part three. The first of these new rules is numbered 600 and, with the blanks left after each chapter, they run up to 1099. In addition to this the committee has reported a code of telegraph rules which begin with No. 1100. These would naturally form part four. The forms of train order blanks and diagrams of hand signals and of classification and tail signals would naturally be classed as appendices.—EDITOR.

phrases from a code of railroad rules, and it is just here that the advantage appears of having the compilation done by a single hand. Any one who thinks that the present compiler has omitted any rule that ought to have been included should think twice before adding a rule himself.

Clearness of language is also a thing that can be evolved only after much re-writing and comparing; and of most clear writers it is largely true, as of poets, that they were born, not made. The compiler of this code shows unmistakable evidence that he is one of this kind. Even if he be not perfect, still it is better that one man edit the whole. Members of the committee who find flaws will do better to advise the compiler to correct than to make alterations themselves. "Composite" language, like a composite photograph, often lacks force.

In the matter of orderly arrangement there is perhaps more room for deliberation by the committee, if perfection is to be aimed at. But we apprehend that any one of a dozen capable managers could make an arrangement that would be nearly as good as the most perfect ideal; so, perhaps, it may be better not to spend much time on this point. The chief value of orderly arrangement is to eliminate obvious crudities, and thus put the code in such shape that it will remain unchanged in arrangement long enough to give the employees time to become familiar with it.

As we have said before now, we regard the work already accomplished by this committee as by far the most valuable part of anything it may or can do in this line. That is, howsoever high a degree of perfection in the rules may yet be attained by further discussion, the three valuable features we have named will remain unchanged. And these were the three elements which depended upon cooperation. No one code ever had all the good features, no one manager ever eliminated all the infelicities of language; and as for the order of arrangement, no one road's standard would be accepted, however good it might be.

The considerations which we have here set forth emphasize the truth that level-headed railroad managers look to the Association for phraseology as well as for principles. A Pennsylvania man at the October meeting referred to a former discussion in which it was stated that the train rule committee understood that it was to confine itself hereafter to principles and let rules alone; but it is to be doubted whether the committee and the convention fully understood each other on that occasion. At all events, if the committee were to issue a code of principles to-day, and repudiate the code of rules which it made in 1887, the latter would still be with us; it cannot be unmade; and, we are bound to say, the language and arrangement, which features constitute the essence of rules, as distinguished from principles, would remain our most valuable possession. A moment's reflection shows this to be so, for the main principles were well recognized long before the code was formulated. There are certain features of practice in which two different principles are recognized by most people as of nearly equal merit, but this is just where the code of principles is weakest. If the most important function of the committee is to enunciate principles, then the establishment of one principle and the rejection of the other would seem to be the thing to be done in a case like this; but in point of fact the committee has only been able to set forth both and let each road make its own choice.

The application of what we have here said was illustrated by the question presented at the meeting concerning rule 600. Mr. Van Etten's answer indicated the true solution of most disputed points.

Efficiency of Locomotive Fuels.

At the last meeting of the Western Railway Club Mr. William Forsyth presented a paper on Locomotive Fuel that is of unusual interest; it contains information about American coal that has a direct bearing on the expenditure for fuel for locomotives. In the *Railroad Gazette* of November 30, page 822, was given a comparison of some Western coals with the fuel used on the Empire State Express locomotives, which indicated how much the economy depends upon the character of the fuel. Mr. Forsyth has given a new set of data which goes further and permits definite conclusions to be reached about specific brands of coal, and shows the comparative value of such fuel to a railroad company. On the C. B. & Q. the fuel cost is about 31 per cent. of the cost of engine service, and engine service is 22 per cent. of the operating expense account and is the largest single item of that account. The fuel expense is therefore about 7 per cent. of the total operating expense, and in 1893 that road used nearly a million tons, which cost about \$1,300,000. This is said by

Mr. Forsyth to be about twice the total tonnage of coal consumed in the city of Chicago in all industrial and heating plants in 1893.

Comparing the steam making value of fuels in common use, taking the best as 100, the least useful ranges down to 60. If the best fuel could be purchased for the same price as the cheapest, there would be a possible saving of about 40 per cent. in the total amount of fuel used, and of about 3 per cent. in total operating expense. There would be a further saving in repairs, delays to trains, etc., resulting from the decreased forcing of the boilers and the greater steaming power with the better fuel. This teaches that fuel should be bought according to its steam-making value. The analysis of fuels is very simple and can be made by any master mechanic or purchasing agent in a few hours and does not require expert knowledge. Mr. Forsyth's paper gives a very simple process for making such analysis.

The paper is summed up in four questions for discussion by the Western Railway Club at its next meeting. First, Are we making any progress in economical coal burning? Second, How can it be most easily and exactly shown from yearly accounts? Third, What is the best method of showing fuel consumption so as to properly grade the performance of the engine-men? Fourth, Will it pay to keep records in sufficient detail to show what we are actually doing in this direction?

It is evident to any one who has watched the progress of locomotive construction and operation, that less fuel is being used now per ton mile than formerly, but, on the other hand, locomotives are forced so much more than they used to be, that, except in the case of those with large fire-boxes, the efficiency of the boiler is less. The increasing weight of trains gives a greater ton mileage and the weight of the locomotive is less in proportion to the weight of the train, therefore on a ton-mile basis less fuel is now used, but so far as the fuel burning of the locomotive itself is concerned, it is a question whether there has been any material advance in average practice for sometime past. About all that has been gained by better design of boilers has been lost by the greater forcing of boilers arising from the increased demand for steam. The exception to this is found in the boilers with large fire-boxes and grates. It is not common practice to use such grates, and therefore the advance in efficiency of locomotive boilers due to large fire-boxes is not gained by most roads. If the question is put in some such form as: "Is the best present form of locomotive boiler more efficient than the best form 20 years ago, when working with the same degree of forcing?" the answer must be emphatically that it is; but, taking the average boiler now and the average boiler then, under the conditions of operation existing at the two periods, the answer would probably be in the negative. It has been pretty clearly shown that the next step in general practice to produce greater efficiency will be the use of larger grates and fire-boxes.

So long as the fuel used is given in pounds per car-mile, regardless of the weight of the cars, the total weight of the train, the speed and other governing conditions, the yearly accounts will not show exactly, and only by accident will they show approximately, the progress made in fuel burning on locomotives in different years, nor will such accounts show the relative values of different kinds of fuel. The best way to settle the question is to confine the examination to trains that run with sufficient regularity and determine approximately the train weight. This eliminates the unknown quantities to a great extent and permits reasonably safe conclusions.

To grade the performance of engine-men requires in the first place intelligent traveling foremen, and the encouragement of the men to do careful engine running. No road can determine a fair basis for comparing the records of different engine crews without a good deal of experience under the specific conditions of operation on that road. A basis must be worked up, month by month, and year by year, until the unknown quantities are determined. This has been the experience of those roads that have a fuel premium system. They have learned that the only way to get a safer basis is to start with a well thought out plan and then correct it from time to time as experience dictates.

The question whether it will pay to keep records to show whether there is an increased efficiency of locomotives from year to year, can be answered directly from the relative costs of the fuel expense and the other expenses of operation. Profit from which to pay dividends and interest is practically the difference between the total receipts and the total operating expense, and where fuel is about 7 per cent. of the total operating expense a saving of, say

20 per cent. in the cost of the fuel, a not impossible saving, may produce a large increase in the profit. As an extreme case suppose a road expends 1,000,000 dollars a year for fuel and 13,000,000 dollars for other operating expenses, and does not make a profit, it will be found that a saving of 20 per cent. in fuel would give a profit of 200,000 dollars. If a road is using an inferior fuel and is paying for it the same price that a better fuel could be purchased for, a saving of 20 per cent. in the cost of fuel is quite possible. If a road uses no traveling engineers or traveling firemen, and has but little control over the carelessness of firemen, there may be a 20 per cent. waste that can be stopped. If the engines are bad and improperly arranged for the fuel used, more than 10 per cent. can generally be saved by proper changes. It is not probable that any road would be so careless as to use a poor grade of fuel at a high cost, and to permit careless firing, and to use bad designs of locomotives, all at the same time, but if such was the case a saving of 40 or 50 per cent. in the cost of fuel might be possible in extreme cases. A good many roads do not know that the fuel is being used on their locomotives under the best conditions, and most roads do not know what the comparative efficiency of their fuel system is, and this alone is enough to show that it would pay to keep records in sufficient detail "to show what we are actually doing in this direction."

Mr. Forsyth's paper is a suggestive one and those who want to know what the master mechanic and superintendents of motive power think about the prevailing fuel systems, should watch what is said at the January meeting of the Western Railway Club when the paper will be discussed.

Railroad Construction in 1894.

Railroad building in this country would certainly appear to have reached its lowest ebb, when the total new mileage built in one year amounts to only 1,761 miles. That is all the new railroad that has been built in the United States in 1894. That figure is lower than any that has been reached since 1875, when the net increase for the year was 1,700 miles, the amount built being somewhat greater. The new mileage reported for 1894, is apparently the smallest actual amount of new railroad built in any year since the Civil War, and it is much the smallest percentage of increase. Taking Poor's figures of the amount of railroad built, at the end of 1893 (177,753 miles), the railroad constructed in 1894 has added less than one per cent. to that total, but this has been an abnormal year in many other things than railroad building.

Every one at all interested knew in January that an exceedingly small amount of new railroad would be built in 1894, the only question being how much the decrease would be. This can be calculated from the following table, giving the amount of main line built in the last eight years:

1887.....	12,900	1891.....	4,010
1888.....	6,900	1892.....	4,150
1889.....	5,200	1893.....	2,585
1890.....	5,350	1894.....	1,761

The percentage of this mileage which has been built in the various groups of states is shown below.

	1889.	1890.	1891.	1892.	1893.	1894.
Northeastern States.....	24	18	23	34.5	31.2	38
Southeastern States.....	36	34	33	16.3	24.2	15
Northwestern States.....	10	21	15	17.8	18.3	18
Southwestern States.....	18	18	18	18.4	19.8	28
Pacific Coast States.....	12	9	11	12.9	5.5	01
	100	100	100	100.0	100.0	100

The table below gives the mileage by states:

Alabama.....	3	North Carolina.....	80
Arizona.....	121	Ohio.....	122
Arkansas.....	49	Pennsylvania.....	83
California.....	24	South Carolina.....	11
Colorado.....	67	South Dakota.....	15
Florida.....	79	Tennessee.....	15
Georgia.....	25	Texas.....	100
Illinois.....	124	Utah.....	17
Indiana.....	52	Virginia.....	9
Louisiana.....	68	Washington.....	5
Maine.....	105	West Virginia.....	69
Massachusetts.....	3	Wisconsin.....	76
Michigan.....	58	Wyoming.....	26
Minnesota.....	19		
Mississippi.....	60	Total United States.....	1,761
Missouri.....	53	Canada.....	253
Montana.....	102	Mexico.....	40
New Hampshire.....	7		
New Jersey.....	35	Total foreign.....	293
New Mexico.....	75	Grand total.....	1,936
New York.....	20		

In writing in January, a year ago, of the outlook for new railroad construction during 1894, we said, "The record of the year, small as it is, gives no indication of the severe depression of the last three or four months. Never in recent years has there been so little work in the line of railroad extension underway at the close of the year as we find in a survey of this field at the present time. The number of roads on which 200 men are now at work on new construction is so small that they can probably be counted on the fingers of one hand. There are a number of projects that are in the hands of such strong companies that they will surely be completed to make good

the sums already invested. In many cases they are commendable, and with the first brightening of the financial skies they will be taken up."

We believe that railroad construction in the coming year will be much more active than for some years past. There has been a considerable revival already, and in the past few months even remarkable progress has been made in resuming active work on projects which were delayed by the financial depression. There is now every indication that all over the country, new railroads of local importance will be taken up and pushed to completion. The work that is to be done hereafter, in railroad building, as we have several times pointed out, is to further the development of local sections. Much of that work can be done without attracting great attention and much of it is now well under way. Several thousand miles of new railroad ought to be built in this country every year, for a greater number of years than it is worth while to try to limit or guess at.

November Accidents.

Our record of train accidents in November, given in this number, includes 59 collisions, 84 derailments and three other accidents, a total of 146 accidents, in which 22 persons were killed and 66 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS:	Rear.	But-ting.	Crossing	Total.
Trains breaking in two.....	9	0	1	10
Misplaced switch.....	2	1	1	4
Failure to give or observe signal.....	6	2	1	9
Mistake in giving or understand- ing orders.....	0	4	0	4
Miscellaneous.....	3	5	5	13
Unexplained.....	4	4	11	19
Total.....	24	16	19	59

DERAILMENTS:

Broken rail.....	1	Misplaced switch.....	4
Loose or spread rail.....	3	Derailing switch.....	1
Defective bridge.....	2	Bad loading.....	1
Broken switch rod.....	1	Track repairs.....	3
Defective frog.....	2	Animals on track.....	6
Broken wheel.....	2	Malicious obstruction.....	4
Broken axle.....	7	Accidental obstruction.....	3
Broken truck.....	4	Unexplained.....	33
Fallen brakebeam.....	1	Total.....	84
Failure of drawbar.....	5		
Broken car.....	1		

OTHER ACCIDENTS:

Cars burned while running.....	1
Various breakages of rolling stock.....	2
Total.....	3

Total number of accidents..... 146

A general classification shows:

	Col- lisions.	Derail- ments.	Other acc'd'ts.	Total.	p.c.
Defects of road.....	0	9	0	9	6
Defects of equipment.....	10	20	2	32	22
Negligence in operating.....	30	19	1	50	34
Unforeseen obstructions.....	0	13	0	13	9
Unexplained.....	19	33	0	52	35
Total.....	59	84	3	146	100

The number of trains involved is as follows:

	Col- lisions.	Derail- ments.	Other acc'd'ts.	Total.
Passenger.....	25	17	2	44
Freight and other.....	83	67	1	151
Total.....	108	84	3	195

The casualties may be divided as follows:

KILLED:	Col- lisions.	Derail- ments.	Other acc'd'ts.	Total.
Employees.....	13	4	0	17
Passengers.....	0	0	0	0
Others.....	0	5	0	5
Total.....	13	9	0	22

INJURED:	Col- lisions.	Derail- ments.	Other acc'd'ts.	Total.
Employees.....	28	19	0	47
Passengers.....	7	7	0	14
Others.....	0	4	1	5
Total.....	35	30	1	66

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road.....	0	0	0	3
Defects of equipment.....	0	1	0	3
Negligence in operating.....	0	10	13	29
Unforeseen obstructions and maliciousness.....	0	1	3	9
Unexplained.....	0	2	1	3
Total.....	0	14	17	47

Twelve accidents caused the death of one or more persons each, and 34 caused injury but not death, leaving 100 (68 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with November of the previous five years shows:

	1894.	1893.	1892.	1891.	1890.	1889.
Collisions.....	59	92	106	112	111	75
Derailments.....	84	101	84	110	90	73
Other accidents.....	3	7	9	4	3	3
Total.....	146	200	199	226	204	151
Employees killed.....	17	43	44	46	44	39
Others killed.....	5	28	17	23	22	3
Employees injured.....	47	108	103	134	125	90
Others injured.....	19	87	96	73	140	77
Passenger trains involved	44	66	75	71	76	50
Average per day:						
Accidents.....	4.87	6.67	6.63	7.53	6.80	5.03
Killed.....	0.73	2.37	2.03	2.30	2.20	1.40
Injured.....	2.20	6.50	6.63	6.90	8.83	5.56
Average per accident:						
Killed.....	0.151	0.355	0.365	0.305	0.323	0.278
Injured.....	0.452	0.975	1.000	0.916	1.299	1.106

We find no account of fatal injury to any passenger in a

train accident during the month of November, and the total number of persons killed, 22, is smaller than in any month for several years, except February of this year, when the number of trains run was probably smaller than in any other month since the falling off in business began over a year ago. There are two very bad accidents in the present record, however. At Larimer, Pa., on the 19th, five miners were killed in the wreck of a freight train. It is not proper to class these men as passengers, and it would be particularly misleading to count them as such in this record, a principal object of which is to indicate the degree of safety with which American railroads carry their passengers in passenger trains. But at the same time the claim agent of the railroad company may find himself obliged to count these victims as passengers or something very like that. Many persons carried on freight trains or under other conditions which are far below those of a regular passenger train in point of safety, are admitted to the premises of the company, or are suffered to remain, under such circumstances that the liability of the railroad is decidedly greater than it is in the case of an out and out trespasser.

The worst accident of the month was the butting collision at Rosensteel, Pa., on the 7th, where the conductor and engineer of a passenger train forgot a meeting point. They were both experienced men and classed as reliable. The freight train was the train of superior right in this case. Whether this was a temporary arrangement and therefore was a factor in the fatal negligence, we do not know; but whether it was or was not, the ultimate preventive of these disasters must be the block system. Even those who argue for the train dispatching system, and base their argument on the fact that mistakes are made in the operation of the "uncontrolled" manual block system, must admit that there is an advantage in having trains started by station signalmen, who follow a definite procedure with every train, and make this their chief business, as compared with depending upon the vigilance of a conductor and an engineer who have many other duties to perform and with whom the matter of looking out for a safe road ahead takes a different form a dozen times a day. In this collision, as in several other prominent ones during the past few years, the vestibules proved their efficiency in saving the car bodies from crushing. It will be a pity, though, if we relax efforts at preventing collisions on the ground that it is cheaper to let them flourish and harden ourselves to put up with them. It is said that Kansas people get used to cyclones and that eels come to enjoy being skinned, but only in the comic papers. The vestibule can earn its cost in softening minor shocks and in protecting passengers from the weather.

Crossing accidents were numerous in November. At Southbridge, Mass., on the 29th, an omnibus full of men was struck by a passenger train and four of the men were killed and a dozen others injured. Electric street cars were struck by locomotives at Cincinnati on the 3d and at Waltham, Mass., on the 5th. Three persons were killed at a single stroke on a crossing in Philadelphia, one of the victims being the flagman. At Elmira, Cal., four men walking on the track were killed at once, and near Cumberland, Md., there was a similar accident, killing three.

An electric car was derailed and overturned near Toledo on the 10th. At Omaha, on the 23d, an electric street car that got a-going too fast jumped the track at a curve and three of the occupants were fatally injured. In Philadelphia, on the 22d, seven persons were injured in street car collisions, there having been eight different accidents on that day in that city.

Annual Reports.

Wheeling & Lake Erie.—The annual report of this company for the year ending June 30, 1894, has been issued within a week or two. The principal results of operation are as below:

	1894.	1893.	Dec. per cent.
Gross earnings:			
Freight.....	\$1,051,131	\$1,230,273	14.5
Passengers.....	155,546	200,195	22.0
Mails.....	15,914	16,195	.....
Express.....	12,609	10,091	.....
Miscellaneous.....	53,384	81,991	35.4
Total.....	1,288,584	1,538,645	16.25
Operating expenses.....	853,195	1,009,382	15
Net from operations.....	435,390	529,262	18
Balance after paying interest, taxes, etc.....	\$102,809	\$212,249	

One hundred and thirty-five thousand dollars was paid in dividends, leaving a debit to income of \$32,191 and reducing the surplus to \$118,415. This is one of the roads which suffered especially from the coal strike last spring. Its tonnage fell off 23.53 per cent. and gross earnings 16.25. The bituminous coal handled fell to 961,383 tons, a loss of over 400,000 from the year before; the ore carried increased, however, from 70,000 tons to 106,000. The bituminous coal business is about 60 per cent. of the total tonnage of the road and the ore business has now become next in importance, although it is still only about 6½ per cent. of the total. Lumber gives about 6 per cent. and there is no other item which rises as high as 4 per cent. of the total tonnage. It will be seen, therefore, that the cessation of the coal business was about as bad a thing as could have happened to the road. The result was a suspension of dividends last July on preferred stock after such dividends had been paid continuously for over six years. While the Directors are pleased with the rapid recovery of business and revenues, and anticipate the resumption of dividends before long, they still think that a highly conservative policy should prevail for the pres-

ent and that the resources of the company should be strengthened.

The President says that it has seemed advisable to arrange for the purchase of considerable additional equipment, and negotiations are pending looking to arrangements for an entrance into Cleveland.

New York & Brooklyn Bridge.—The annual report of the trustees of the New York & Brooklyn Bridge is for the year ending Dec. 1, 1894. The earnings for the last two years were as below:

	1894.	1893.
Railroad.....	\$1,111,816	\$1,167,498
Carriage-ways.....	87,268	85,410
Total.....	\$1,199,084	\$1,252,908

The income from the railroad, it will be seen, fell off nearly \$56,000, while the receipts from carriageways increased \$1,858. The passengers carried by railroad diminished from 42,615,105 in 1893, to 41,714,235 in 1894. We suppose that this decreased use of the railroad results entirely from hard times, as we know of no other reason. It follows, doubtless partly from a smaller movement of people across the river and partly from careful economies which have led people to walk or to use the ferries, the fare on which is less than the Bridge railroad, being two cents, normally, and one cent in four "commission hours." This difference, however, is not great, as the single tickets by the Bridge railroad are 3 cents, and two tickets are now sold for 5 cents.

Since the railroad has been in operation, 11 years and 67 days, a total of 346,589,521 passengers have been carried, the greatest number carried in any one year having been in 1893. Of all these passengers no one has ever been fatally injured in transit. In the last year 86 persons were accidentally injured by falling on the stairs and from other causes.

The total time lost by delays from all causes during the year was 2 hours and 47 minutes, an average of one minute for each 250,000 passengers carried. Those who read the New York and Brooklyn newspapers will probably be surprised at this record, for the imagination of the reporters and the carelessness of the editors have given a very different notion of the regularity of the Bridge service from that which is derived from the exact record. Of the total time lost by delay only 30½ per cent. was due to failure or defect in the cable machinery.

The report mentions the fact which we have already recorded, that it has been determined to adopt electric lighting for the Bridge cars, and that a contract for the installation of the system has been awarded and work has begun.

Last winter the citizens of Pittsburgh expended, through a committee, the sum of \$256,721.52 for the relief of the unemployed of that city. By this expenditure work was given to an average of 2,907 men for 91 days, the employed having been 13,529, and the individuals helped, through their families and dependents, numbered 60,498. Not a cent of this sum was given, we believe, directly as charity, but all was spent, except the very small cost of administration, in wages at a dollar a day, and an equivalent was got in work which went to the permanent improvement of two parks in that city. The chairman of the general committee says in his report to the citizens "for generations to come the work of the relief brigade will be a glorious monument to your charity and to the spirit in which it was bestowed and received." The detailed report of the work of this relief committee has recently been published, and although the subject is rather remote from transportation there are several reasons why we think it well to give a little space to it in the *Railroad Gazette*. In the first place the work was organized and administered on a rational basis and in an efficient way; that is, relief was given only for an equivalent in work and great pains was taken to see that no undeserving person was hired and that each man's dollar was earned. In the second place the gentlemen who organized and contributed to this relief are many of them very well known to our readers and prominent in the railroad world or as manufacturers of railroad supplies; and finally, Pittsburgh is one of the most important centers of railroad interests and the interests closely connected with railroads in the country. The Chairman of the General Committee and of the Executive Committee, was Mr. William McConway, of McConway & Torley. The Chairman of the Finance Committee was Mr. Robert Pitcairn, of the Pennsylvania Railroad, and in the lists of the committees will be found many names very familiar to railroad men. The work of relief began Dec. 18 and was carried on uninterruptedly until April 5. About 2,000 subscriptions were received, Mr. Andrew Carnegie having given in all \$125,922.19. The other subscriptions ranged from 25 cents up to \$10,000, the latter sum having been given by the Westinghouse companies.* The cost of administration was \$3,292.42, or about one and one-third per cent. of the total sum. The report gives a detailed account of the manner of giving out employment and of keeping records. In each case an investigation was made to ascertain whether the applicant actually needed relief and to prevent men from outlying districts coming to the city for work. The men were rotated; that is, those who

*Subscribers to the amount of \$1,000 each were Arbuthnot, Stephenson & Co., Arbuckle & Co., Bank of Pittsburgh, Farmers' Deposit Bank, First National Bank, People's National Bank, E. N. Bigelow, Charles J. Clark, Denny estate, employees Westinghouse Electric & Manufacturing Co. (\$1,700); William Flynn, H. C. Frick, T. A. & R. G. Gillespie, Joseph Horne & Co., Iron City Brewing Co., Thomas C. Jenkins, Jones & Laughlin's (\$2,000); C. L. Magee, McConway & Torley Co., estate W. K. Nimick, Park, Brother & Co., People's Natural Gas Co., Henry Phipps, Jr., Pittsburgh Gas Co., Mrs. Mary E. Schenley and Schoenberger & Co.

had been working two or three weeks, were discharged, giving place to others; then after a time the old men were taken on again when they still wished work. Whenever unworthy persons were discovered they were immediately discharged. The men hired were sent to work at the park nearest to their homes, the city being divided into districts for this purpose. Censuses were taken, the results of which appear in some interesting tables. Over 71 per cent. of the men employed were English speaking. Classified by occupations it appears that there were 8 professional men employed, 30 commercial men, 1,810 skilled laborers and 11,683 laborers. It is a singular fact that but one bookkeeper appears in the lists. There were 2 civil engineers, 4 electricians, 73 machinists, only 2 carpenters and 47 railroad men. Aside from those classed as laborers the greatest number following any given occupation was from the mill workers, of whom there were 1,084; next were puddlers 270, then glass workers 199, carpenters 169 and teamsters 112. No other occupation furnished as many as 100. Taking the employed by nationality, the Americans furnished 39.55 per cent., the Irish 23.55, the Germans 12.84, the Poles 7.84 and the English 5.06. No other nationality contributed as much as 5 per cent.

Where a street railroad can carry passengers frequently and rapidly, as the new electric lines do, a parallel steam railroad generally gives up trying to compete for the business. This has been the case at most places where new electric lines have been built within the last few years. But according to the Harrisburg (Pa.) papers there is one road, the Cumberland Valley, which has not taken this view of the case. Between Harrisburg and Mechanicsburg, eight miles, where it is proposed to build an electric line, the Cumberland Valley has put on additional trains and now runs 10 each way daily; and they continue their trips to Carlisle, 11 miles beyond Mechanicsburg. Moreover, it is intimated that fares will be reduced, if necessary, to retain the business. We admire the grit of the officers of this road and hope that they will see that the question at issue is settled on its merits. The stations on this road, as shown in the time tables, are not very near together, and if there are many people living along the highway between the villages, we should suppose that there, as elsewhere, cars running in the street, and stopping every 500 ft. or 1,000 ft., would have a great advantage, in spite of lower speed, less comfort and more danger. But people who thus put up with disadvantages to avoid inconvenience of some other kind, ought to understand what they are doing, and that in giving free and easy charters to street car lines, without adequate taxation or protection for other users of the street, they may be paying for the new facilities dearer than they think. Some one has suggested that the way for the owners of an established railroad to meet these new inroads on their business is to buy or build street lines themselves, and it is reported that this idea has been carried out in one place. This may satisfy the financial grievance of the interests immediately affected, but does it furnish the best settlement for all concerned? An established steam railroad, with costly roadbed, powerful engines and strong cars, deserves proper protection of its interests by the State, not simply because it is a railroad, but because it affords means for traveling (and carrying goods) with both safety and speed; and furthermore, because its capacity can be readily expanded. These things are valuable to the public, and will increase in value in the future; they should not be lightly ignored.

Senator Sherman has again introduced in Congress his bill to limit the rates to be charged for berths in sleeping cars. This time it is in the shape of an amendment to the Patterson bill to make pooling legal, and it also requires sleeping cars to be provided with iron safes for valuables. Representative McEitrick, of Massachusetts, has introduced in Congress a bill to create a department of commerce, into which would be consolidated eleven bureaus of the Treasury Department, others from other departments and the Interstate Commerce Commission. Representative Erdman has introduced a bill to promote the settlement of strikes. It was drawn up by Labor Commissioner Carroll D. Wright, and refers particularly to railroad employees. The phraseology of the bill is modelled to a considerable degree after that of the Interstate Commerce law, and there is to be a commission of five members receiving \$7,500 a year each. There is a provision to encourage the incorporation of employees' associations, in which it is stipulated that members shall forfeit their membership if they participate in any acts of violence.

It was reported last week that Debs had decided to go to jail without attempting to get any higher court to modify Judge Woods' decision. Lack of funds in the treasury of the American Railway Union seems to have been one of the causes of this determination. Later, however, it was reported that Debs' lawyers had concluded to apply to the Supreme Court of the United States for a writ of habeas corpus, and as they seem to have been all at sea since the contempt decision, it is impossible to tell what they are driving at. A Chicago dispatch states that Debs and 73 other members of his union are to be brought into court on January 4, to be tried on a criminal charge of conspiracy. If this is so, some of the points left unsettled in Judge Woods' decision may be cleared up, as a jury trial will probably bring out facts that Judge Woods does not seem to have deemed it necessary to dwell upon in the contempt pro-

ceedings. So far, however, as can be judged from what the Woods decision discloses, the whole crowd of strikers, Debs and all, have very little to say for themselves. The ultimate question, taking the most favorable form of the defense, which Debs has claimed that he would be able to make, is, whether the man or men responsible for a peaceable strike are to be held responsible for violence which accompanies it, but which they did not aid in producing. But it is not likely that the issue will be so clearly drawn, for a presumption of innocence is badly needed by any one who attempts to show that a strike is intended to be peaceable. There has been a good deal of sympathy with Judge Jenkins' view that such a thing is impossible.

The subject of rating train loads by weight seems to be engaging the attention of a good many superintendents, and some are making experiments. A Columbus (O.), paper reports that Superintendent W. S. Connors, of the Columbus, Hocking Valley & Toledo, has been using this plan for two years. He began with a list of 136 trains, which resulted as follows:

	Rated by Cars.	Rated by Tons.	Increase.
Number of trains.....	68	68	...
Number of loaded cars.....	1,841	2,072	231
Weight of loading, tons.....	34,425	40,291	5,766
Average number cars per train..	27	30½	3½
Average paying weight, per train, tons.....	506	593	87

Variable conditions, such as the time of starting, delays and the state of the weather, were taken into consideration in the test. The tonnage of each car was taken from the way bill by the yard clerk. A maximum and minimum number of cars was determined and a fixed tonnage was assigned to each class of engines.

NEW PUBLICATIONS.

Journal of the Association of Engineering Societies.—The November issue of this Journal contains papers on The Concrete Construction on the Illinois and Mississippi Canal by Mr. Woermann; on The Brooklyn Elevated, by Mr. A. A. Stuart; on The Ohio and Canadian Sulphur Petroleum, by Professor Mabery; on Street Grades and Intersections by Mr. W. B. Fuller, and two papers by Lieut. Col. Jared A. Smith, Corps of Engineers, U. S. A. on The Sea Wall at Fort Taylor, Fla., and Improvement of Cuyahoga River. The valuable Index to Current Literature fills 7½ pages.

New England Roadmasters' Association.—The proceedings of the 12th annual convention of the New England Roadmasters' Association, held last August, are now printed in pamphlet form. The pamphlet may be obtained of the Secretary, Mr. M. C. Hamilton, New York, New Haven & Hartford Railroad, Hartford, Conn.

The Roberts Steam Track Laying Machine.

What is said to be the first use of the Roberts track-laying machine east of the Missouri River is on the Chicago, Paducah & Memphis Railroad now building in Illinois. This road has had 40 miles, from Marion to Mt. Vernon, in operation for some months. The Northern Division, from Mt. Vernon to Altamont and on the Wabash Railroad, has been graded and the bridges built and the track-laying has just been commenced by J. H. Roberts with the Roberts steam track-laying machine. Mr. F. P. Read, the Chief Engineer of the railroad, states that two miles of track are laid daily and the full number of ties placed in the track. Mr. Read is well pleased with the work of the machine and believes it to be superior to any other machine for laying track. The tie delivery provides ties for full tying under all conditions. This saves the cost of going over the work a second time to put in additional ties. Mr. Read gives the following tables showing the number of men required to lay ties and rails on two miles of track each day with the number of men required to each part of the work.

These men operate the machine, taking all material from the cars and putting it in place. They full tie, half bolt, and quarter spike.	These men follow the train and finish the work.
3 foremen	4 distributing spikers and
1 engineer on machine	stayers
4 men loading ties on trains	4 buck strappers
2 men placing rails on trains	12 " spikers
7 men placing rails	6 " nippers
8 " " ties	1 oiler
4 " " head spikers	5 lining truck
2 " " nippers	6 spacing ties
3 " " strappers	
1 man tie liner	38 men
35 men.	35 "
	Total 73 men

Foreign Railroad Notes.

The Society of German Engineers had nearly 9,363 members last June.

Dining cars ran last winter in Italy between the French border at Ventimiglia and Genoa, and between Pisa and Rome. The railroad company reports that on the first of these routes an average of 20 breakfasts and 11 dinners daily were taken, and on the second 9 breakfasts and 17 dinners. Both routes are on a principal line from France to Rome.

In spite of its great poverty and its financial disorders, Italy continues to plan and to build many new so-called tramways, which are really light railroads, worked at low

speeds by steam or electricity, and usually laid in the public highways wherever space and grades permit. Probably no other country approaches it in the mileage of such lines, which is partly explained by the very dense population outside of the cities, which gives a heavy passenger traffic if rates are low; for the population is generally very poor.

Italy in 1890 had 4,756 inhabitants per mile of railroad. The number of passenger journeys was at the rate of 1.6 per inhabitant, of about 43 miles each. The gross earnings were at the rate of \$5,887 per mile of road, \$1.28 per train mile, and \$1.57 per inhabitant. In this country the expenditure per inhabitant for railroad transportation was about \$16.70 in 1892—more than 10 times as much as in Italy.

Bulgaria is to have a new railroad, to run from Sofia to Pernik, and work on it has already been commenced. As a means of developing the coal mining industry of the country, the line, it is said, will be of the greatest importance.

A New Ticket Punch.

We illustrate herewith a new punch, designed and made by Messrs. Warren Hill & Co., of Hartford, Conn., which differs materially from the ordinary punch, both in construction and operation.

The stripper, or shell surrounding the upper punching jaw, which carries the male die, is pivoted, not at the main axis or fulcrum of the punch, but at the point near that fulcrum, where the rivet head shows in the engraving. The stripper is thrown free from the upper jaw, releasing the ticket after punching, by a spiral spring placed inside the stripper, about half way between the fulcrum and the nose; this is held in place by a nipple.



Hill's Ticket Punch.

and is not shown in the engraving. Placing the spring in this position, instead of near the extreme end of the jaw, brings the male die closer to the end, making the punch shorter and more compact.

The stripper is guided and kept within limits, in throwing off the ticket after punching, by the screw working in a slot, as shown in the engraving at the outside end of the upper jaw. The fact that the stripper and the jaw, carrying the male die, have different center of motion, gives a sliding movement to the stripper, which slightly moves and helps to release the ticket after it is punched. The device has an extra long reach, the slot for receiving the ticket measuring 1½ inches. This is especially useful for commutation and duplex tickets.

The punch is known as "Hill's 94," is the invention of Mr. Warren Hill, and is in use on several railroads.

TECHNICAL.

Manufacturing and Business.

The Otis Engineering & Construction Co., of Yonkers, N. Y., was incorporated in New York last week, to manufacture machinery and railroad supplies and to construct railroads. William D. Baldwin, of Yonkers, Thomas E. Brown, Jr., and Charles F. Parker, of New York City, are directors. The capital stock is \$50,000.

The New Jersey Dock & Bridge Building Co. has been organized at Elizabeth, N. J., and will carry on the business of the late Eli A. Young, the dock and bridge builder, of Elizabeth. All his interests have been purchased by the new company, of which Charles H. Moore is President; General George H. Rhodes, is Vice-Presi-

dent and Manager, and County Engineer Louis Quien is Secretary and Treasurer.

A circular letter informs us that Mr. John P. O'Donnell, well-known in this country as Consulting Engineer of the National Switch & Signal Company, has resigned his position with Messrs. Dutton & Co., signal engineers, and has entered into partnership with Mr. Evans, under the firm name of Evans, O'Donnell & Co. The firm will supply signalling material of all sorts and is prepared to do general railroad engineering work, including the erection of signalling plants. The address is Palace Chambers, Westminster, S. W., London.

A company called the Loop Construction Co., was formed in Chicago last week with G. Douglas Hotchkiss, George E. Newton and William M. Johnson, named as incorporators.

A friendly reorganization of the Smith Locomotive Fire Kindling Co., is now proceeding. The organization of the new company will soon be completed and the introduction of the Smith Locomotive Fire Kindling devices will be actively pushed. The old company has recently surrendered its charter under an agreement between Mr. C. T. Smith, patentee, H. O. Nourse, the manager of the company, and other stockholders.

Iron and Steel.

The representatives of the Valley Steel Co., of St. Louis, capitalized at \$450,000; the Union Trust Co., of Indianapolis, and the several Alexandria Land companies, have reached an agreement locating the proposed rail and Bessemer steel plants of the St. Louis company at Alexandria. The St. Louis company gave \$75,000 for the old Depauw plant, and will consolidate the works at Alexandria and New Albany, and erect a new plant at Alexandria.

The National Tube Works and Rolling Mill, the Monongahela furnace and Boston Iron and Steel Works, McKeesport, shut down for repairs Dec. 22. All the above works are controlled by the Tube Works Company.

Government Adoption of the Metric System.

At the World's Congress of Electricians at Chicago in 1893, the adoption of standard units of electrical measurement based on the centimeter, gram and second was recommended. The American Institute of Electrical Engineers petitioned the United States Congress in the spring of 1894 to adopt those units as the legal standards in the United States, and Congress accordingly passed an Act last summer establishing them. Some details were left to be attended to by the National Academy of Sciences. Among the interesting points in the debate upon the bill in the House of Representatives on the 9th of June were the reference to the constitutional authority of Congress to fix the standard of weights and measures, the statement that Germany and Great Britain had already adopted the electrical standards in pursuance of the recommendation of the Congress at Chicago, and the argument that the expenditures of the United States Government for electricity are now so large that it is a matter of commercial importance to establish legal units of measurement for it. Hon. Charles W. Stone, of Pennsylvania, a member of the Committee on Coinage, Weights and Measures, had charge of the bill.

In the London *Times* of Nov. 21, 1894, is the report of a general meeting of the New Decimal Association held on the preceding day at the London Chamber of Commerce, where, after the passage of a resolution about a Select Committee of Parliament, it was voted, "That the Hon. William L. Wilson be informed of the present position of the movement in this country for adopting the metric weights and measures, and that he be urgently invited to use his influence to secure such legislation as may provide for the adoption of this system of weights and measures in the United States."—*Journal Association Eng. Soc.*

Enamelled Steel Switch Targets.

Messrs. N. L. Piper & Son, of Toronto, Ont., after protracted experiments, have succeeded in making a steel plate covered with red enamel which, it is believed, will serve as a cheap and durable switch target. These targets have been in use for some time on the Grand Trunk, and have thus far given perfect satisfaction. Targets made of this material will remain smooth (and therefore will keep clean) longer than a painted target, and the color will not fade.

An Oil Engine Launch.

An oil engine launch, says *Dingler's Polytechnic Journal*, was recently used most successfully in connection with the German army manoeuvres near Mayence, its particular work having been towing the pontoons for the military bridges over the Rhine. The boat had a steel hull, was about 25 feet long, and was propelled by a 3-horse-power motor. Its weight, completely equipped, was somewhat over 1,300 lbs., and the quantity of oil carried was 50 liters, sufficient for a 36-hours' run. The engine was so installed in the boat that it could be lifted out easily and placed on a wagon for transportation, and for the boat itself a special wagon was provided, so that it could be carried overland when necessary. It is understood that in view of the excellent service rendered by the boat at the Mayence operations, several such launches have been ordered by the German military authorities.

Electric Heating for Steamships.

Steamship heating is a new field for the employment of electric heat which has attracted the attention of the Consolidated Car-Heating Co., Albany, N. Y. It offers its regular form of street car heaters as in the main well

adapted for steamship heating but where desired it is furnishing special forms of its heaters.

The Mannesmann Process for Rolling Steel Tubes.

The most remarkable discovery in mechanics since that involved in the Giffard injector is presented in the Mannesmann process for rolling steel tubes. By this process a hot steel billet is passed in between two conical rolls set with their axes at a small angle to each other, and comes out on the other side as a tube with uniform walls, without the use of a mandril or anything else to make the central opening. This process in fact realizes the familiar Hibernian description of the means of making a cannon: "You take a hole and cast metal round it."

In the Mannesmann process it seems as if a hole were taken to serve as a mandril and the steel were rolled on it into a tube. So far as the process admits of a popular explanation, the following would seem to be the best that can be given. If an uniform bar of steel be stretched lengthwise it will gradually thin down, by the yielding of the surface layers, until it breaks. If, however, the bar be much harder on its surface than in its interior, then the interior layers or substance will yield first, developing a cavity along the axis of the bar. It may be supposed that the first effect of the rolls on the hot billet is to harden its surface, and then the elongating strain causes a parting of the interior portions and the formation of a tube. Tubes made in this way, from the size of a knitting needle to a diameter of 10 inches, were exhibited at Chicago last year. If a billet is drawn down beforehand at its ends and at one or more points in its length, to the diameter which it would have after passing the rolls, the result would be to produce a tube closed at both ends and wherever else the billet was drawn down. The tube in this case must be vacuum except so far as it may contain gases extracted from the steel during the rolling process.—*President Morton, in Stevens Indicator.*

A New Bridge at Niagara Falls.

Some of the newspapers have made considerable talk about a project for building a new bridge over the Niagara gorge to take the place of the present suspension railroad bridge. Concerning this, we may say, that it is a fact that Mr. L. L. Buck has been making studies for such a bridge for some time, but that it is not yet certain when the new bridge will be built, or if one will be built at all, although the probabilities seem to lean towards a single arch bridge to be built before a great while.

Master Mechanics' Association.

A committee, Mr. A. E. Mitchell, chairman, has sent out a circular to get information for a set of proportions for riveted joints, representing the most approved practice. Information is requested of the latest practice adopted by those who reply, and not of old styles. Specific directions are given in the circular and replies are requested not later than February 15. Should this come under the eye of anybody who does not receive the circular he can get full information by addressing Mr. Mitchell, at 21 Cortlandt street, New York.

Another circular is sent out by a committee of which Mr. P. Leeds is chairman, and asks for information as to the causes of bulging of fire-box sheets. The questions are, whether the difficulty is caused by mud or scale, by insufficient water space, by bad water, by the fact that the inside of the sheet is hotter than that next to the water, by faulty spacing of stay-bolts, by the use of oil in boilers, or by variation of temperature between outside and inside of sheets.

Another circular is concerning the best material for boiler tubes, Mr. T. A. Lawes, Mechanical Engineer, C. C. & St. L. Railway, Indianapolis, Ind., chairman. The questions in this circular cover the best material for tubes, specifications if any, maximum length for given diameter, thickness for given diameter, methods of fastening tubes at front and back end, and other matters.

THE SCRAP HEAP.

Notes.

Nine passenger conductors have been discharged on the West Shore.

The ordinance which the Chicago City Council passed some months ago declaring turnstiles at the passenger gates of certain Illinois Central way stations (within the city limits) public nuisances, has been declared null and void by a court.

Charles Jones, one of four men who robbed a Northern Pacific train at Grey Cliff, Mont., in August, 1893, has been sentenced to imprisonment for 10 years. He was once sentenced to be hung, but got a new trial. The other three robbers were killed by their pursuers.

The annual passes of the Wagner Palace Car Co., for 1895 are made in the shape of a book of coupons. According to the reporter who got a glimpse of one, the number of coupons is 48. Presumably this is the maximum number of trips made in a year by a Wagner dead-head.

Mr. George H. Daniels, General Passenger Agent of the New York Central, issues a circular giving warning that his name is being wrongfully used by a young man named M. W. Waters, who is trying to borrow money, and claiming that he was formerly connected with the New York Central.

The officers of the Pennsylvania Railroad have been considering the question of operating the Camden & Atlantic Railroad by means of electric motors. This

road is about 60 miles long and in the summer the excursion traffic is very large; heavy express trains are run through at high speed with few or no stops. The Philadelphia & Reading has a parallel line to the same seashore resorts and the competition is sharp.

The Pennsylvania Railroad Co. proposes to sink an artesian well on its Filbert street property, near Sixteenth street, Philadelphia, with a view to providing a supply of water for the Broad Street Station and the other buildings of the company east of the Schuylkill River. At present water is supplied by the city, the company paying upwards of \$4,000 yearly. An artesian well system can be provided sufficient in extent to meet all the company's needs for \$8,000, it is estimated.

Electricity in Shops.

Another illustration of the growing use of electric motors has just been given in France, where the Société de la Vicille-Montagne has replaced all the steam engines used in its works at Jemeppe-sur-Meuse by electric motors, 37 in number, ranging from 1 to 70-horse-power each. The electric current is furnished from a central station.

South American Notes.

Don Ramon Garcia has accepted the Director Generalship of the Chilean State Railroads, succeeding Don Enrique Budge, resigned.

A technical commission has been formed for making studies for the great port works which are to be undertaken at Montevideo, Uruguay. Don Juan José Castro is President.

The government of Rio Grande do Sul, Brazil, has invited tenders for the improvement of several river channels in that State. The contractors are to have the privilege of collecting tonnage dues for a certain number of years for the use of these channels.

The great need of trunk line railroads in Brazil, one north and south, the other east and west, seems to be realized by those now in power in that country. The granting of important concessions for lines connecting several States along the Atlantic seaboard, and the building of some important sections, has been a feature of railroad activity in Brazil during the current year. Now a commission is being formed to make surveys for a line from Cuyabá, at the head of navigation on the Paraguay River system in Mato Grosso, to Goyaz on the Rio Araguaia. The Mogyana Railroad is pushing on westward, and will ere long reach Goyaz.

Ore Docks at Ashland to be Enlarged.

Ruttman & Ryan, of Menominee, Mich., have secured the contract for raising the Wisconsin Central ore docks, at Ashland, Wis., by 8 ft. This has become necessary on account of the increase in the size of lake carriers. The work will be begun at once. The Chicago & Northwestern will also raise its Ashland docks this winter, and will extend them 300 ft. further into the bay.

Plan to Run Trains Direct to Liverpool Pier Head.

The Mersey Dock Board, of Liverpool, has submitted to the London & Northwestern Railway a plan for running trains direct to the Liverpool pier head to meet the ocean steamers from America. The plan is designed to shorten the time and decrease the inconvenience of the trip from New York to London via Liverpool.

Gold Mining in Ontario.

The new gold region along the boundary line between Minnesota and Ontario has attracted the attention of the Canadian government, which is quick to assist with internal improvements, and it will grant a heavy subsidy for a road from Wabigoon, on the Canadian Pacific road, to the mouth of the Seine river on the boundary, a distance of 70 miles. Expert mineralogists are of the opinion that the region will develop some permanent and rich gold properties. Excellent results are obtained from assays. The assistant State geologist of Minnesota reports that of several hundred samples he had taken in the Seine region on a recent trip not one but had gold in good quantity. To get into the region from the United States a sleigh ride of 100 miles is necessary, and material is going in slowly. However, there are now stored at Duluth three mills for gold reduction which are to be taken up when the ice is thick enough for teaming. Both the Duluth, Missabe & Northern and Duluth & Iron Range are said to have run preliminary lines to the district.

Petroleum at Baku.

In the Baku district are over 500 oil wells, though not all of them are productive. Some of the wells have been exhausted, while others have been only partly driven. The actual number of productive wells rose from 448 in 1892 to 472 at the end of 1893. At that time 102 wells were being driven; 60 had been commenced, and 61 had been finished during the year, and 102 had been deepened. The total output of crude oil in 1893, not counting the loss from overflow and the considerable quantity used as fuel at the points of production, amounted to 337,051,834 pounds (13,482,073,360 lbs.), representing an increase of 66 per cent. during the past five years. In 1889 the yield was only 205,544,000 pounds (8,221,760,000 lbs.). From Baku shipments are made to Astrachan for the interior of Russia; to the trans-Caspian ports for Persia and Central Asia; and to Batum for southwestern Russia, Europe, and the far East.

Grain Inspection at Minneapolis.

The annual report of the State Weigh Master of Minnesota has been sent to the State Railroad Commissioners. This officer, with 48 subordinates, keeps track of the grain delivered to the elevators in Minneapolis. The number of cars weighed into and out of elevators and mills during the year was 150,735, of which 124,524 contained wheat. Besides these cars there were 1,900 cars of hay, feed, potatoes, coal and other commodities weighed in the yards. The report recommends the passage of a law providing that whenever persons are found on the track, among loaded cars, where they have no business, carrying away grain in sacks, such act shall be prima facie evidence of the larceny of such grain. An act of this nature could work no harm or injustice to an innocent party. A number of arrests have been made where the guilt of the arrested party has been morally certain, but owing to technicalities in the law, conviction could not be secured.

The Central Transportation Co.'s Suit.

The long and hotly contested suit of the Central Transportation Company against Pullman's Palace Car Company, involving \$3,000,000, was decided at Philadelphia, Dec. 18. The decision was rendered in the United States Circuit Court by Judges Dallas and Butler, and the Court appointed a master to assess damages.

The Central Transportation Company and the Pullman Company were merged on February 17, 1870. The Pullman Company was to pay the Central Transportation Company \$264,000 per annum, subject to certain contingencies. In January, 1885, a dispute arose, and the Central Company sued for the next instalment of rent and recovered judgment, which was afterward reversed. Another suit was brought for the next instalment, and the Pullman Company repudiated the lease by denying its validity as in excess of the lessors' authority and against public policy. This defence was sustained by the Supreme Court. The Pullman Company, while the case was pending, filed a bill for an injunction to restrain further prosecution of the suit and against bringing other suits for subsequent instalments.

The Court declined to interfere with the suit pending, on the ground that the validity of the contract could be thus tried as well as in equity, but enjoined against bringing other suits for subsequent instalments. The plaintiff moved to discontinue the bill, and the defendant for leave to file a cross bill to enforce return of property or compel compensation. The first of these motions was dismissed and the second allowed. The Pullman Company's answer to the cross bill, denying the responsibility for the property received, raised the principal question now decided.

New Storage Accommodations in Philadelphia.

The Pennsylvania will put in use on Jan. 1, two important storage warehouses in Philadelphia. One of these is a hay storage warehouse near the present Kensington freight station. The new building is of corrugated iron, and is 50 ft. x 144 ft., and one story high. The company has a large hay storehouse at Thirty-second and Market streets, with a capacity of 100 carloads. The opening of the Kensington storehouse, which has a capacity of 30 carloads, will save the trans-shipment of hay from West Philadelphia to the Kensington dealers. The new four-story flour warehouse of the Merchants' Warehouse Co., on the property of the Pennsylvania Railroad, near the Shackamaxon freight station, will also be opened on Jan. 1. The building, which cost \$60,000, has a capacity for 40,000 barrels of flour, and will also be used for the storage of canned goods. It is built of brick and iron. The erection of this building was necessary for the convenience of dealers in the northeastern section of the city. The Pennsylvania Railroad has two large flour warehouses at Eighteenth and Market streets, with a capacity of 100,000 barrels, but these were inadequate to store all the flour and canned goods shipped to Philadelphia.

The Newport News Shipyard.

Nearly 1,600 men are now on the pay-roll of the Newport News Shipbuilding & Dry Dock Co., a greater number than has been at the plant for a long time. The work now on hand and that to be done early in the coming year is important. After the repairs to the steamer New York, of the American Line, are finished, it is thought that the steamer Paris, of the same line, will be overhauled.

Economy of Joint Car Inspection.

A correspondent at Columbus, O., writes that the Columbus Division of the Central Association of Railroad Officers has decided that a car is delivered to a connecting line when it is placed on the proper track, with suitable billing, and that to hold that a car is not delivered till the inspector accepts it will lead to complications as to who would be responsible for shortage due to thefts. Master Mechanic B. Fitzpatrick, of the P. C. C. & St. L., reports to the Association that under joint inspection of cars there has been during four months a saving of over 19 hours per car at Columbus. A few more than 100 cars were returned to connecting lines during the four months, as against 4,200 cars during the same period in 1893, a gain of 4,100 cars.

Not Needed in New York State After Jan. 1.

A Maine Central conductor tells the following story in connection with the well-known fact that it generally costs a railroad less to kill a passenger in an accident than to maim one. A very inquisitive passenger one day began asking the brakeman all sorts of questions about things that he saw. The employee answered courteously and explained everything until the conversation began to weary him. "What is that axe for?" suddenly asked the passenger, pointing to an implement fastened to the end of the car, with the words over it: "For accident only." "What do you want of an axe in case of accident?" "Why, that," replied the brakeman, "is what we use to kill the wounded ones with. We don't have to pay as much for dead people as for live ones, so when there's an accident that axe saves money."—*Leveiston Journal*.

Nineteen Passengers Killed at Chelford, England.

A press dispatch of Dec. 23 reports a disastrous collision on the London & Northwestern at Chelford, about 15 miles south of Manchester, in which 19 persons were killed and 40 injured. The passenger train consisted of two engines and 16 passenger cars, well loaded with people from Manchester going to London to spend the holidays. At the station named, several freight cars which were being switched near the main track, became uncontrollable in consequence of a violent wind which was blowing, and ran away on a track which fouled the main line diagonally. The passenger train was running about 40 miles an hour, and the engine and first three cars passed before the collision occurred, but all the other cars were derailed, and several were completely wrecked. The shock of the collision extinguished all the lights in the cars. The engineer did not see the obstruction soon enough to apply the brakes with any effect.

Lake Notes.

The American Steel Barge Co., of Superior, Wis., is to build for the Standard Oil Co. two 8 tank steel vessels for carrying oil along the Atlantic Coast. The vessels will be 170 ft. long over all, 33 ft. beam and 17 ft. deep. Though the American Steel Barge Co. is primarily a builder of the whaleback type, and several Standard Oil men are interested in it, these vessels will not be whalebacks.

In past years the close of lake navigation was almost complete, with the shutting off of insurance Dec. 1. Now, however, with the advent of more and more staunch ships the more progressive insurance corporations have changed their policies, and now a number of large vessels are still plying between Lakes Michigan and Erie. It was the 7th of December when the last ship passed out of Lake Superior. There is no question but the season of navigation on the great lakes will hereafter be limited less by the insurance rates, and more by the weather. There was no reason why the Lake Superior coal and flour traffic should not be kept moving until Christmas. This matter is of a good deal of importance to the railroads.

The whaleback steamer Pathfinder and her consort Sagamore, have broken all records for the number of

round trips made by a steamer and consort during the season. Since leaving Chicago April 5 last, the Pathfinder and Sagamore have made 24 round trips, twenty-two of these being from Duluth to Ohio ports with iron ore. In all, the two boats have carried about 120,000 gross tons of iron ore, 9,000 tons of coal and 500,000 bushels of grain. These two vessels are part of the Minnesota Iron Co.'s fleet. At average current rates, their gross receipts for the season must have been about \$95,000 for ore, \$7,500 for grain and \$1,800 for coal.

LOCOMOTIVE BUILDING.

The Cincinnati, Hamilton & Dayton has received three new engines from the Pittsburgh Locomotive Works.

CAR BUILDING.

The 250 freight cars which the Mt. Vernon Car Co. is building for the South Carolina & Georgia Railroad are to be standard ventilated box cars of 60,000 lbs. capacity, and will have Westinghouse brakes and automatic couplers.

The St. Louis Southwestern has recently received from the St. Charles Car Co. three coaches and two chair cars. The coaches are finished in oak, and equipped with Scarritt seats. They have four-wheel trucks, 4½x8 journals. The chair cars are of a handsome design, finished in mahogany throughout. They are equipped with the Scarritt twin reclining chair. These cars have six-wheel trucks, with 4x7 journals. All of the cars are equipped with Pitsch gas. They have been assigned to service on the Memphis and Ft. Worth through line.

BRIDGE BUILDING.

Baltimore, Md.—Specifications for the City & Suburban Railroad bridge across Colgate Creek were submitted to contractors last week. The specifications were prepared by Mr. F. H. Smith, the consulting engineer of the company. The bridge will be 1,600 ft. long and will extend from Point Breeze, the present terminus of one of the City & Suburban lines, to St. Helena. It is to have a steel draw in the center. The new bridge is only to accommodate the electric cars of the City & Suburban Co. and will be built for two tracks. There will be no facilities for foot passengers or for vehicles other than street cars.

Bloomsbury, N. J.—A large new iron bridge will be erected by the citizens of Bloomsbury, Hunterdon County, N. J., at the foot of Taylor street, across the Musconetcong Creek.

Duluth, Minn.—Senator Washburn has introduced a bill in Congress amending the act authorizing the construction of the Duluth-Superior bridge between Conner's and Rice's Points. The changes are both in the interest of the bridge company, and if passed will greatly reduce the cost of constructing the bridge. The bill permits the company to run both railroad and street cars upon the same track.

Easton, Pa.—The plans and specifications for the new open bridge over the Delaware River to connect Easton and Phillipsburg are about completed, and will be sent to the bidders in a few days. They were prepared by Prof. J. M. Porter, civil engineer.

East Liverpool, O.—Dec. 22 work was begun at the West Virginia end for the projected steel bridge to cross the Ohio River at this point. It is promised that the structure will be finished within a year. The channel span will be 650 ft., the bridge will be very high and will be the finest between Pittsburgh and Wheeling.

Elmira, N. Y.—The Committee on Bridges has recommended that bonds be issued not to exceed \$115,000 for the erection of two new bridges, one to span the river from Madison avenue to Sly street, and the second to extend across the Chemung from Walnut street and open into Gardiner avenue in the Fifth Ward. When the bill is passed by the State Legislature, it will be submitted to the citizens of Elmira at a special election.

Granville, Ont.—The Department of Railways and Canals, Ottawa, invites tenders for rebuilding the swing bridge at this place. Plans may be seen at the office of Mr. Ernest Matceau, Superintending Engineer, Montreal.

Highland, N. Y.—The Philadelphia, Reading & New England Railroad has just completed a construction of a new iron bridge over Black Creek at Highland. James McGraw & Co., of Philadelphia, were the contractors.

Iowa Falls, Ia.—The rock foundation and piers for the new steel bridge to be built across the Iowa River at this point by the Illinois Central Railroad are completed and some of the ironwork is on the ground. The new bridge will replace the temporary structure erected after the old bridge was burned last fall.

Little Rock, Ark.—The Little Rock Bridge & Terminal Co. has signed a contract with the Missouri Valley Bridge Works for the construction of a railroad bridge across the Arkansas River at Little Rock. This bridge will be used by the Little Rock & Memphis and other roads entering Little Rock from the East.

Phoenixville, Pa.—The shops of the Phoenix Iron Co. are working busily on material for the Lake Street Elevated Railway, of Chicago, which the company is erecting. The company is also furnishing the iron work for a bridge in Philadelphia, where Torresdale avenue crosses Pennypack Creek. Two of the girders for this structure are each 80 ft. long, and weigh 25 tons apiece.

Pittsburg, Pa.—The Grand Jury on Dec. 21 approved the reports of viewers in the matter of a bridge over Pine Creek in McCandless and Hampton townships, and recommended that it be erected at the county's expense. Reports of viewers on the following bridges were also approved: Campbell's Run, Shaler Township; Lewis Run, Jefferson Township; Moon Run, Robinson Township; Little Deer Creek, West Deer Township. These reports go before the next Grand Jury, and if approved the bridges will be erected.

St. Augustine, Fla.—The Pittsburg Bridge Co. has been awarded the contract for a draw-span 229 ft., 6 in., c. to c., together with the pivot and end piers, by the Jacksonville, St. Augustine & Indian River Railroad. The draw will be operated by hand.

Scranton, Pa.—The contracts were awarded last week for the new bridges in Scranton, for which bids were received a few weeks ago. The contracts were awarded as follows: Linden street bridge to the Edgemoor Bridge Co., of Wilmington, Del., asphalt flooring, \$72,100; Roaring Brook bridge to the Phoenix Bridge Co., of Phoenixville, Pa., asphalt flooring, \$87,345.

A bill has been re-introduced into Councils last week for the construction of a viaduct over the Delaware,

Lackawanna & Western track on West Lackawanna avenue. It provides for a committee comprising the Mayor and three members from each Council and the City Engineer, who shall investigate the question and report upon the feasibility of the scheme.

Stanford, Que.—Mr. Joseph Lacoursière will apply to the City Council for permission to build an iron bridge on the Beaucourt River, between Stanford and St. Louis-de-Blancford.

Toledo, O.—The City Council has located the new up-river bridge. It will be at Fassett street. The plans will provide for a roadway either 26 or 32 ft. wide, with a 6-ft. sidewalk on each side.

Washington, D. C.—The commerce committee of the House of Representatives has favorably reported bills for building railroad bridges across the Missouri River near Jefferson City, the Little River in Arkansas and the Sulphur River in Texas or Arkansas.

RAILROAD LAW—NOTES OF DECISIONS.

Carriage of Goods and Injuries to Property.

In Texas it is held that a shipment of freight over connecting lines from Missouri to a point in Texas by a bill of lading which provides that the receiving carrier shall only be liable for damage occurring on its own line, and which guarantees a through rate of freight to such point, is an interstate shipment, within the interstate commerce act; and, though the entire haul of the last connecting line is within the State of Texas, an overcharge by it on such shipment is a matter to be adjusted under the interstate commerce act, and not under the laws of Texas.¹

In Kansas it is held that where a railroad for the purpose of properly constructing its roadbed, takes earth from one part of its premises and uses it upon the roadbed, thus leaving a ditch along each side of it, in the usual way of constructing in level countries, the company will not be liable to an adjoining landowner, through whose premises a right of way has been properly condemned and paid for, on account of injuries caused by surface water, even though the effect of such ditches and roadbed may be to prevent surface water, which before flowed upon the land from coming upon it, or to draw from adjoining land surface water which would otherwise remain there, or to shed surface water over land on which it would not otherwise go.²

The Supreme Court of South Carolina rules that a railroad must remove bushes or other growth, calculated to obstruct the view of its engineers, to the outer bank of the side ditches, or from all the ground of which it assumes actual dominion for corporate purposes; and if it fails to do so, and a horse is killed by a train because concealed by the bushes, it is liable.³

In the Federal Court it is held that owners of stock in the Indian Territory have a right to let them run at large, and it is not contributory negligence to turn horses loose to graze in the vicinity of a railroad track, upon which they stray and are killed.⁴

In New York it is held that the statute providing that a railroad company shall give no preference for the transaction of the business of a common carrier on its cars, or in its depots, or on its grounds, to any persons competing in the same business, or in the business of transporting property for themselves or others, does not require a railroad company to allow all hackdrivers alike to use its grounds as a standing ground to solicit business at its depots, when they have no contract with a passenger.⁵

In Texas it is ruled that heavy and unprecedented traffic does not relieve a carrier from liability for breach of a contract to furnish cars at a certain time.⁶

In New York a wooden powder mill, painted with fire-proof paint, tin-roofed, situated 200 feet from the railroad track, and without openings on that side, exploded just as an extraordinarily dense volume of smoke from a passing engine blew down over the mill. Deceased had gone into the mill a few moments before. It did not appear that any openings to the mill were open at the time. The mill had stood for 13 years. No witness saw sparks in the smoke. A number of powder mills in the neighborhood had exploded in preceding years from defects in the machinery or carelessness of the men. The Court of Appeals holds that there was no evidence to support a finding that sparks from the engine caused the explosion.⁷

In the District of Columbia it is ruled that a freight train may be regarded as a passenger train, within the meaning of the law, when passengers are conveyed thereby for compensation, in any kind of cars, by authority of the railroad company.⁸

Injuries to Passengers, Employees and Strangers.

In Texas it is held that a trespasser improperly expelled from a car by a brakeman, who seeks to hold the company liable therefor, must show that the acts of the brakeman were within the scope of authority in fact conferred on him by the company, since the duty of expelling trespassers rests, prima facie, on the conductor.⁹

In Georgia it is held that where the conductor of a freight train, having caboose attached to accommodate passengers, announced distinctly in the hearing of persons assembled, at a place where the train did not usually stop to receive passengers, that they must not get aboard there, but that the train would move out and stop for them elsewhere, a person who did not hear the announcement, and was injured while attempting to board the train at that place, neither the conductor nor any of the train hands being aware that he was endeavoring to board it, cannot recover from the company.¹⁰

The Supreme Court of the United States holds that an experienced railroad employé, familiar with a certain freight yard, and knowing that unblocked frogs are in use there, assumes the risk incident thereto; and where the evidence shows that in attempting to make a coupling he put his foot into a frog, and was warned of the danger thereof, but persisted until his foot was caught, the court should instruct the jury to render a verdict for defendant.¹¹

In Colorado it is held that an express messenger, who, by a contract between the express company and railroad, also handles the latter's baggage on the train, and is required by a rule of the road to consider himself its servant in matters relating to the movement and government of the train, and to obey the conductor, may re-

¹ T. & P. v. Clark, 23 S. W. Rep. 698.

² M. & P. v. Renfro, 34 Pac. Rep. 802.

³ Ward v. W. & W., 18 S. E. Rep. 211.

⁴ Eddy v. Evans, 58 Fed. Rep. 151.

⁵ N. Y. C. & H. R. v. Flynn, 26 N. Y. S. 859.

⁶ Gulf, C. & S. F. v. Hume, 24 S. W. Rep. 915.

⁷ Babcock v. Fitchburg, 35 N. E. Rep. 596.

⁸ United States v. Saul, 58 Fed. Rep. 763.

⁹ T. & P. Ry. v. Mother, 24 S. W. Rep. 79.

¹⁰ Curry v. G. M. & G., 18 S. E. 422.

¹¹ So. Pac. v. Seely, 14 S. Ct., 530.

cover from the railroad for injuries caused by the negligence of a brakeman.¹²

In Texas, in an action for personal injuries against two railroads, it appeared that the track was opened by one of the companies, but was used by both, and that they employed jointly all section employes, including the superintendent, but the men running the trains were employed by the respective companies. The accident was caused by an engineer, under the order of the superintendent, going on a side track where there was a steep down grade, and attempting to couple some loose cars. The cars were pushed off the side track onto the main track, the two being connected by a split switch, and ran down the grade, colliding with a train of the other company, and injuring plaintiff, a fireman on such train. The Supreme Court rules that both companies were liable, the proximate cause of the injury being their joint negligence.¹³

In Indiana it is held that a railroad is not liable for injury to person thrown from a car through negligence of the trainmen, he being engaged in working his passage under an arrangement with the conductor and brakeman; they having no authority to employ assistance, and there being no custom or regulation of the company permitting the payment of fare by work on the train.¹⁴

The Supreme Court of Missouri holds that persons who were killed in the wreck of a train, caused by its leaving the track, were not guilty of contributory negligence by reason of sitting out on a flat car, though the conductor had told them he would rather they would go into a box car next behind, as it was more comfortable, safer, and better there.¹⁵

In Wisconsin it is held that a switchman about to make a coupling, who knows that the engineer has not, in obedience to his request, slowed up or stopped the train, when within a few feet of the car to be coupled, and who knows that the train is running at a dangerous rate of speed, is negligent in staying between the cars to make the coupling; and a finding to the contrary will be set aside.¹⁶

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Canada Southern, semi-annual, 1½ per cent., payable Feb. 1.
Chicago, Rock Island & Pacific, 1½ per cent., payable Feb. 1.
Fitchburg, 2 per cent. on the preferred stock, payable Jan. 15.
Lake Shore & Michigan Southern, semi-annual, 3 per cent., payable Feb. 1.
Michigan Central, 2 per cent., payable Feb. 1.
Norfolk & Southern, quarterly, 1 per cent., payable Jan. 10.
Worcester, Nashua & Rochester, \$2.50 per share, payable Jan. 2.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Cleveland & Pittsburgh, annual, Cleveland, O., Jan. 2.
Boston & Lowell, annual, Boston, Mass., Jan. 2.
Brooklyn Elevated, annual, Brooklyn, N. Y., Jan. 2.
Cleveland & Pittsburgh, annual, Cleveland, O., Jan. 2.
Philadelphia & Reading, annual, 12th and Market Sts., Philadelphia, Pa., Jan. 14.
Pickering Valley, annual, Philadelphia, Pa., Jan. 14.
Reading & Columbia, annual, Philadelphia, Pa., Jan. 14.
Western New York & Pennsylvania, annual, Philadelphia, Pa., Jan. 14.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of January, March, April, September and October, at 10 a. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station, on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Wednesday in each month, at 8 p. m. The headquarters of the society are at 51 Lakeside Building, Chicago.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Foundrymen's Association* meets at the Manufacturers' Club, Philadelphia, Pa., on the first Wednesday in each month.

The *Western Foundrymen's Association* meets in room 701, Western Union Building, Chicago, on the third Wednesday of each month. B. W. Gardner, Monadnock Block, Chicago, is secretary of the association.

The *Association of Civil Engineers of Cornell University* meets on Friday of each week at 2.30 p. m., from October to May inclusive, at their Association Rooms in Lincoln Hall, Ithaca, N. Y.

The St. Louis Superintendents' Association.

The following officers have been re-elected: E. P. Bryan, of the Louisville & Nashville, President; W. S. Wilson, of the Cairo Short Line, Vice-President, and F. E. Anderson, Secretary.

Toledo Superintendents' Association.

The annual meeting of the Toledo Association of Railway Superintendents was held last week. These officers were elected: President, F. F. Whittlesey; Vice-President, A. E. Robbins; Secretary and Treasurer, William Grogan.

New York Railroad Club.

The regular meeting of the club was held on Dec. 20, and 19 new members were elected. Mr. R. A. Parke, as chairman of the committee, reported on the proposed changes in the constitution and by-laws, which are to be voted on at the next meeting.

A paper on Steel Axles was read by Mr. L. R. Pomeroy. The paper gave the results of tests of steel axles made by the author and by other persons.

American Society of Civil Engineers.

At the meeting of the Society held Dec. 19 a paper on "Wind Bracing in High Buildings" was read by Mr. Guy B. Waite. In the general discussion Mr. George B. Post referred to the need of better protection of the steel cage work. He thought that greater care should be taken to protect the metal from moisture to prevent corrosion. He gave an instance which came under his observation. When he remodeled the Times Building he found that a beam which had been in the building for 35 years and which stood over the engine room was seriously corroded although it was enclosed in brick.

Engineers' Club of St. Louis.

The annual supper was held at the Mercantile Club on Dec. 19, the attendance being 44 members and eight visitors, President Crosby in the chair.

The Executive Committee reported the result of the letter ballot for officers for 1895, as follows:

President, S. Bent Russell; Vice-President, J. A. Ockerson; Secretary, William H. Bryan; Treasurer, Thomas B. McMath; Directors, B. L. Crosby and Wm. Bouton; Librarian, J. N. Judson, and Members Board of Managers' Association of Engineering Societies, J. B. Johnson and W. E. Barns.

Retiring President Crosby introduced Mr. Russell, the president-elect, who took the chair and called on Mr. Crosby for an address. The latter gentleman then read an address on the St. Louis extension of the St. Louis, Keokuk & Northwestern Railroad, describing fully the tracks, yards, bridges, culverts, paving, ballast, grades, curves and other features of interest. Particular attention was paid the Bellefontaine bridge across the Missouri River. After discussion by Messrs. Holman, Judson, Wheeler, Johnson and Kinealy, it was, on motion, voted that further discussion be postponed until a later meeting.

Western Railway Club.

The Western Railway Club met Dec. 18 in the lecture room of the Field Columbian Museum, in Chicago. Director Skiff, of the Museum, had invited the Club to do so, and had at the same time extended all the privileges of the Museum to Club members and their friends. About 150 members availed themselves of the opportunity. The morning was spent in inspection of the wonderful treasures of the museum, most of the members keeping closely in the transportation department. At noon all went over to the Hotel Windermere for lunch. Regular business was taken up at 2.30 p. m. in the lecture room. A letter from the Southern & Southwestern Railway Club suggesting joint action on revision of the Interchange Rules, was disposed of by the passage of a resolution to appoint a committee to report on such revision at the February meeting, discussion on the matter to be deferred till the April meeting. The committee appointed on this was J. N. Barr, G. W. Rhodes, C. A. Schroyer. A good discussion was had, based upon Mr. Barr's paper on the "Scrap Pile," which was presented at the November meeting. The M. C. B. coupler was also up for discussion for a short time. The paper of the day was upon "Locomotive Fuel," and was presented by Mr. William Forsyth.

Roadmasters' Association.

The Executive Committee of this association met at Chicago, December 17. The proceedings of the New York Convention were read and approved. The committee confirmed the awarding of the prizes offered by *The Railway Age*, as decided in New York. The subject for the third annual contest for the prizes is economy in the selection, use and renewal of ties; the papers not to consider any chemical method of preservation.

The Executive Committee elected Mr. J. B. Dickson, of the Chicago & Northwestern, Assistant Secretary and Treasurer. His office is at Chicago.

The following subjects for discussion are announced, the name appended to each subject being that of the chairman of the committee appointed to prepare papers upon it: Joint Fastenings; J. W. Wright; Preservation of Ties, Morton Riddle; Hollow tires, and the injury caused by the same to split switches, spring rails, and rigid frogs, J. B. Dickson; Standard Track Tools, G. W. Merrell; Track Records, Chas. S. Churchill; The Advisability of Increasing the

Length of Rails and Using Mitre Joints, R. Caffrey; Gage of Car Wheels and Track, and the Flangeway of Guard Rails, C. E. Jones; Methods of providing for expansion in long connection rods to derails, and split switches, J. A. Kerwin.

Southern & Southwestern Railway Club.

The proceedings at the November meeting are now published in pamphlet form. At that meeting the election of officers for next year was held with the following result: President, F. H. McGee; First Vice-President, R. P. C. Sanderson; Second Vice-President, W. H. Thomas; Treasurer, A. G. Steinbrenner; Secretary, S. A. Charpiot. The Secretary and Treasurer were re-elected.

The next meeting will be held Jan. 17, the following being the subjects for discussion:

1st. "What is the Cause of Uneven Wear of Driving Wheel Tires, running in the Southwestern Territory?" Messrs. Wm. Rutherford, P. H. Schriber, W. H. Hudson, special committee.

2d. "What is the most Economical Method of Obtaining Compressed Air, for General Use in Railroad Shops, and its Application?" Messrs. T. W. Gentry, W. E. Brodnax, W. J. Hartman, special committee.

3d. Discussion of the report on Counter-Balancing of Driving Wheels.

4th. Additional report of committee on Draft Sheets and discussion of the subject.

5th. "What is the Most Economical Tonnage Spring? The Elliptic, Half Elliptic, or the Coil, considering the first costs and the duration of efficiency of each, and its effect on the rolling stock and track." Messrs. R. P. C. Sanderson, S. A. Charpiot, Geo. Morris, special committee.

A committee of which Mr. J. M. Holt was Chairman, reported on the subject of handholds and Safety Appliances for Protection of Trainmen, the committee having been instructed to investigate the subject and find if the railroads are living up to the standards of the M. C. B. Association. The conclusion is that a large percentage of flats, gondolas and coal cars, as well as many box cars, are without handholds, especially on the ends, and that railroad managers either regard the fourth section of the Safety Appliance Act 113 as unconstitutional or think that its enforcement will be extended beyond July 1, 1895. A letter of inquiry was sent to members of the Master Car-Builders' Association asking for certain information, and the result indicates that the majority of equipment men are supplying handholds both to the sides and ends of the cars and think them necessary to safety. A large number think that these, while necessary with link-and-pin couplers, will be unnecessary after equipment with automatic couplers. Objections were made to handholds on the ends of cars as dangerous to man.

Another report was read from a committee of which Mr. E. H. McGee was Chairman, on Agents and Appliances for Removing and Preventing Boiler Scale. The committee concludes that if certain chemicals are introduced into the water at regular intervals, good results will be obtained in reducing the amount of scale formed, and that the adhesion of scale can be prevented by the use of kerosene oil.

This cannot be done satisfactorily in the absence of some device for introducing the oil or compound at regular intervals. The committee received blue-prints of such a device made by the Detroit Lubricator Company and Mr. J. V. Motter, which will do the work so far as the introduction of oil is concerned. The most certain cure for scale is regular mechanical cleaning, which can be aided by the regular introduction of detergents agents.

In the discussion Mr. Sanderson said that he had experimented with a great many remedies for boiler scale, oilers among other things, all of which proved a failure. He does not believe that any compound can be used to prevent scale where different kinds of water are used. The proper place to treat the water is at the water station. Something might be done in this way. The officers of the Panhandle road, who have had considerable trouble with the water in Ohio, had consulted with Dr. Dudley, who had nothing better to recommend than more frequent washing out, which has had a measure of success. It has been proved that some boiler explosions have been caused by the injudicious use of oil.

Other reports were on Draft Sheets as related to economy of fuel, Mr. C. B. Gifford, Chairman, and on Counter balancing, Mr. R. P. C. Sanderson, Chairman.

PERSONAL.

—Mr. Edgar Hill, formerly General Freight Agent of the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed Traffic Manager of the Louisville, St. Louis & Texas, with offices in Louisville, Ky.

—Mr. Richard Gentry has resigned the position of General Manager of the Kansas City, Pittsburgh & Gulf road, and the duties of that position have been assumed by President E. L. Martin. Mr. Gentry becomes Chief Engineer of the road.

—The new Governor of Texas announces that he will appoint to the Railroad Commission of that State Hon. L. S. Ross, who is now President of the State College at Bryan, and who was Governor of the State for four years previous to Governor Hogg's term. The retiring Commissioner is Mr. L. L. Foster, and the Board will now consist of Messrs. Reagan, Ross and Story.

—Colonel Samuel Moody, of Cincinnati, has been appointed Assistant General Passenger Agent of the Pennsylvania lines, with headquarters at Pittsburgh. He will assume the duties of the office on Jan. 1. Colonel Moody is recognized in the West as a most experienced Passenger Agent. He was formerly Assistant General Passenger Agent of the Pennsylvania at Cincinnati, but resigned last July on account of ill health. The position to which he has now been appointed is a new office.

—Mr. J. G. Ruple, District Passenger Agent of the Pennsylvania Lines West of Pittsburg, has resigned. He has been in the employ of the Pennsylvania Company for over 20 years. He first entered the service of the Pennsylvania Company in 1874, as ticket agent at Pittsburg. In 1873 he was at Kansas City as Traveling Passenger Agent, remaining there for one year. He next held the same position in Denver for seven years, and then at Des Moines for a year and a half. He was then transferred to Columbus, O., as District Passenger Agent, which position he held for six years.

—Gen. W. B. Bend, Treasurer of the Chicago Great Western road, has been elected Vice-President and Auditor, in the latter capacity succeeding Mr. M. C. Healion, who resigned recently. Arnold Kalman has been elected Treasurer in place of General Bend. General Bend entered the service of the Minneapolis & Northwestern in September, 1885, as Secretary. In January, 1887, he was appointed Treasurer. He has since continued in that office, under the Chicago, St. Paul & Kansas City and Chicago Great Western, the successors of the Minnesota & Northwestern.

¹² U. P. v. Kelley, 35 Pac. Rep. 923.

¹³ G. H. & S. A. v. Crockett, 25 S. W. Rep. 486.

¹⁴ Cooper v. L. E. & W., 36 N. E. Rep. 272.

¹⁵ Berry v. Mo. Pac., 25 S. W. Rep. 229.

¹⁶ Kennedy v. L. S. & T., 57 N. W. Rep. 976.

ing the position of Assistant Passenger Agent before his promotion to the Assistant General Passenger Agency. He will go into other business. Mr. Duback, who succeeds Mr. Rhodes, was in every way qualified for his new position, having been in the employ of the Rock Island for the past seven years. He was Chief Clerk in the office of the Assistant General Passenger Agent of the Rock Island at Topeka, Kan., before being transferred to Chicago. He has been Chief Clerk to General Passenger Agent Sebastian since July 1, 1890.

—Mr. George L. Rhodes, for the past five years Assistant General Passenger Agent of the Chicago, Rock Island & Pacific, has resigned. Mr. Rhodes will be succeeded by G. W. Duback, the present Chief Clerk in the general passenger department of the same road. Mr. Rhodes has been with the Rock Island for the last seven years, holding a decision of a commission to be appointed by Legislative act. There was a bitter contest on this subject in the last Legislature between Bridgeport and the company, but now it seems probable that the commission plan will be accepted. The lowest estimated cost of the Bridgeport improvement has been \$2,000,000.

—Mr. Richard Newell, Jr., Superintendent and Chief Engineer of the Midland Terminal road in Colorado, was murdered on Dec. 19, on the line of his road, near Cripple Creek, Col., by a miner, who disputed the right of the railroad to build its track across the property on which his cabin stood. Mr. Newell had entered the cabin with some legal papers relating to the dispute, and on leaving the house was followed by the miner, who raised a rifle and shot the Superintendent, who died within ten minutes. Mr. Newell was a nephew of the late President Newell, of the Lake Shore & Michigan Southern road. He was about 27 years old, and had been in Colorado for five years. He was a graduate of the Massachusetts Institute of Technology, and had been Chief Engineer of the Midland Terminal since its construction was undertaken about three years ago.

—John O'Donovan died in Santiago, Chili, S. A., on Nov. 14, at the age of 80 years. At the time of his death the locomotive called the "Copiapo," which in former years belonged to the Copiapo Railway, was on exhibition as a curiosity in Santiago, forming part of the Exhibition of Mining Machinery lately held there. The Copiapo is reputed to be the first locomotive that ever ran in South America, and O'Donovan is said to have been the first locomotive runner in South America. At the time of his death, O'Donovan was in the employ of the Chilean Government Railroads, and it was considered very fitting that he should take part in the Exhibition along with the locomotive, the foot-plate of which he had worn for many years. Up to a few years before his death he had been occupied in regular train service at or near Concepcion. On the 18th of October he fell sick, at the inauguration of the Exhibition, and died in less than a month. O'Donovan went to South America with Mr. Walter W. Evans, who built the Copiapo Railway, as well as others, and who was known personally and by repute, not only to thousands of our readers but to the whole world of civil engineers. We believe that O'Donovan's first experience in locomotives was on the Harlem Railroad in New York. His burial took place on the 15th of November and was attended by delegations from the railroad shops, as also by the Chilean Minister of Public Works, by Senor Jose de Respaldisa, President of the Exhibition, as also by various other officials of note. At the grave a speech in reference to the merits, long services, etc., of O'Donovan, was made by the Secretary General of the Exhibition, Senor Luis L. Zegers. For the foregoing we are indebted to Charles F. Hillman, C. E., who has been employed in the construction of various railroads in Chili, at one time under the then Chief Engineer, Mr. W. W. Evans.

—Mr. Jacob M. Clark, a distinguished civil engineer, was killed upon the Central Railroad of New Jersey, on the morning of Dec. 21, 1894, having accidentally stepped from one track, to avoid an approaching train, in front of one coming from the other direction.

Mr. Clark was born in Vermont, graduated at the University in Burlington in 1845, and immediately joined the engineering parties which had then just begun the surveys for the location of the Vermont Central Railroad, being soon put in charge of the division at Hartford, under Col. James Moore, the Chief Engineer. On the completion of the road he took charge of the surveys and construction of the new portions of the Champlain and St. Lawrence Railroad, between Rouse's Point and Montreal.

In 1855, when Col. Moore became Chief Engineer of the Central Railroad of New Jersey, he was joined by Mr. Clark as his principal assistant. He continued in this office until Col. Moore was made Consulting Engineer of the road, when Mr. Clark became head of the department. For the last few years, however, he has not permanently attached to the company. His intimate knowledge of the history and properties of the corporation called for his constant assistance, and it was upon some errand in connection with its affairs that he met his death.

Mr. Clark was one of the most earnest, painstaking, learned and retiring of engineers; warmly attached to his old friends, fond of fun in a quiet way; but more fond of study and of mathematics than of all else;—and he gave much attention to the metrology of the ancients, being perhaps as widely informed upon this subject, writing upon it also, as any scholar of the day.

Upon the revival of the American Society of Civil Engineers, after the war of the rebellion, Mr. Clark joined the society and took an active interest in it, until the increase of years made it more pleasant to remain at home, in Elizabeth, where he has lived for about 40 years. Mrs. Clark and four daughters survive him.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio Southwestern.—H. C. Archer, Southwestern Traveling Passenger Agent, has resigned and B. F. Egan, formerly of the Texas & Pacific, succeeds him.

Chicago Great Western.—The Directors have elected General W. B. Bend, present Treasurer of the company, Vice-President and Auditor, and Arnold Kalman, Treasurer. The changes follow the resignation of Auditor M. C. Heallon.

Lake Shore & Michigan Southern.—L. E. Johnson has been appointed Superintendent of the Michigan Division, vice T. F. Whittlesey, who was transferred to the Toledo Division some months ago.

Montpelier & Wells River.—The following appointments have been announced to take effect January 1: F. W. Stanyan, to be General Agent at Barre, Vt., to succeed C. J. Bailey, Local Agent, transferred. C. J. Bailey to be Agent at Groton, Vt., to succeed F. M. Cutting, transferred.

Maine Central.—The annual meeting of the railroad was held at Portland, Me., Dec. 19, 34,406 shares being represented. The old Board of Directors was re-elected entire

as follows: Franklin A. Wilson, Bangor, Me.; Payson Tucker, Portland; Lucius Tuttle, Boston; Samul C. Lawrence, Medford, Mass.; Lewis Cass Ledyard, New York; George M. Pullman, Chicago; Henry M. Whitney and Henry R. Reed, Boston; William G. Davis, Portland; Joseph S. Ricker, Portland; Thos. W. Hyde, Bath; John Ware, Waterville; Francis W. Hill, Exeter, Me. Franklin A. Wilson was re-elected President; Payson Tucker, Vice-President, and Josiah H. Drummond, Clerk.

Ohio River & Charleston.—President S. Hunt announces the general officers of this company, formerly the Charleston, Cincinnati & Chicago, as follows: A. Tripp, Superintendent of the South Carolina Division; A. N. Molesworth, Chief Engineer and Superintendent of the Tennessee Division; H. J. Bruce, Auditor; E. F. Gray, Traffic Manager; S. B. Lumpkin, General Freight and Passenger Agent; P. H. Freeman, Car Accountant; G. Nutting, Supervisor Bridges and Buildings. The names of the new Directors were given in our issue of Nov. 23.

Philadelphia, Reading & New England.—George H. Sullivan, who came from a Western railroad, where he was Roadmaster, has been appointed Roadmaster of this railroad, with headquarters at Poughkeepsie, N. Y.

Seattle, Lake Shore & Eastern.—The Receivers announce the separation of the accounting department from the traffic department. G. W. Harris has been appointed Auditor, and will have immediate charge of the accounts of the Receivers, including car service accounts. The traffic department will be continued under the immediate charge of W. J. Jennings, General Freight and Passenger Agent, with office at Seattle, Wash.

Toledo, Ann Arbor & North Michigan.—W. F. Bradley has been appointed General Superintendent, vice Charles Stein, Superintendent of Transportation, resigned. The offices of Superintendent of Motive Power and Cars, Roadway and Construction, and of Transportation, were abolished. The change puts General Superintendent Bradley at the head of all departments. He was formerly Superintendent of Motive Power and Cars, as stated last week.

Wabash.—J. S. McGuigan, Division Roadmaster, having resigned, T. F. Burke, Division Roadmaster, has been transferred with jurisdiction between St. Louis and Montgomery; headquarters at Ferguson, Mo. W. P. Elrod, Division Roadmaster, is transferred, with jurisdiction between Montgomery and Brunswick; headquarters at Moberly, Mo. William Nietmann has been appointed Division Roadmaster with headquarters at Ottumwa.

Wiscasset & Quebec.—T. R. Atkinson has been elected Chief Engineer of this railroad, now being constructed through Maine, north of Wiscasset, Me. His headquarters will be at the latter town. Mr. Atkinson has recently been engaged on surveys for the St. Croix & Penobscot road.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Arkansas City, Oklahoma & Texas.—Chief Engineer C. F. Leech, with a party of eight assistants, has started on a preliminary survey of the line southwest of Arkansas City, Tex. The line will cross the Rock Island road near Hennessey. The proposed southwest terminus is Vernon, Tex.

Atlantic, Florida & Gulf.—The construction work on this railroad has been undertaken by C. C. Smith, formerly Assistant General Manager of the Rio Grande Western, who is now Vice-President of this company. His headquarters are at Kissimmee, Fla. The first portion of the railroad, which it is proposed to build, is from Rock Ledge, on the east coast of Florida, a station on the Jacksonville, St. Augustine & Indian River road, westerly across Osceola County to Kissimmee, about 40 miles. The Florida Engineering Construction Co. has been organized to build the road.

Benton Harbor & Southeastern.—Work is now being done on this railroad beyond Benton Harbor, Mich., on Lake Michigan. The work is in charge of W. W. Graves, Chief Engineer, and it is expected that the road will be finished by next summer to South Bend, Ind. The present projectors, it is understood, have been able to arrange for the amount needed to complete the road. J. M. Caulfield, of South Bend, is one of the present projectors.

Coudersport & Alleghany.—Last week the engineering corps finished locating the Ulysses extension. The line is 23 miles long, with a maximum grade of 116 ft. to the mile. From Coudersport to Gold the grade does not exceed 75 ft. to the mile. The clearing through the woods will be made this winter.

Cumberland Valley.—The project of this company to build a line from Richmond Furnace, Pa., over the route of the abandoned South Pennsylvania into the soft coal region of Bedford County, with a connection with the Pennsylvania at Mt. Dallas, has not been abandoned, but is simply lying dormant for the present. Engineer Chauncey Ives has been travelling through Fulton and Bedford counties lately on business connected with this project. He states that nothing further will be done until spring. The company has obtained through condemnation proceedings those portions of the old South Pennsylvania leading from Harrisburg to White Hill, three miles (including the bridge piers in the Susquehanna River) and from Roxbury to Mt. Dallas.

Delaware & Hudson.—A committee of the State Land Board, New York, consisting of State Treasurer Colvin and Attorney General Hancock, gave a hearing last week on the application of the Adirondack Railroad, which is operated by the Delaware & Hudson Canal Co., for leave to extend its line from North Creek to Long Lake, in the Adirondacks, 30 miles. Horace G. Young, Second Vice-President of the Delaware & Hudson, and prominent lumber men argued in favor of the construction of the proposed road. The report of the Board will be published this week.

Ellaville, West Lake & Jennings.—This road has recently been opened for traffic from Ellaville, Fla., north through Hamilton County to the small town of West Lake. The distance is about 11 miles. Jennings, the ultimate northern terminus, is on the Georgia Southern & Florida, a few miles south of the Georgia State line. The road connects at Ellaville with the Florida Central & Peninsular and also with the Suwannee River road, which has its northern terminus at that town. The General Manager is E. E. West.

Elm Creek, Spring Creek & Salt River.—W. M. Thomas, S. Odell and others are named as the incorporators of this railroad in South Dakota. The line is to be built south from Odell City, a small town near Buffalo Gap, in the southern part of the Black Hills district, and on the Elkhorn & Missouri Valley Railroad.

Findlay, Ft. Wayne & Western.—The extension of this road to Ft. Wayne, Ind., is nearly completed. The

rails are all down and the ballasting finished to within about 10 miles of Ft. Wayne. It is expected to complete the line in a few weeks. The road enters Ft. Wayne between the tracks of the Pittsburgh, Ft. Wayne & Chicago and Wabash. The extension is about 17 miles long.

Gulf, Beaumont & Kansas City.—The old iron rails in the track north of Beaumont, Tex., are being replaced with heavy steel rails. The iron rails are to be immediately forwarded to Buna, the present terminus, and will be put down on the 15 miles of new road that has recently been graded to Kirby, Jasper County.

Houston & Magnolia Belt.—The controlling interest in the Houston & Magnolia Belt Railroad has been secured by northern parties and arrangements have been completed to extend its line to Galveston, Tex. The proposal is to enter Galveston on the bridge which it now seems likely will soon be built across Galveston Bay, by the Terminal Company, of which Eugene Sweeney is one of the active projectors. J. M. Phillips, lately Superintendent of the Kentucky Union road, will be in charge of the work.

Kansas City, Pittsburg & Gulf.—A. E. Stillwell, President of the Missouri, Kansas & Texas Trust Co., has recently returned to Kansas City from Europe, where he had gone to negotiate securities for extending the railroad from Siloam Springs, Ark., to Shreveport, La. He states he has secured the funds necessary to complete the road to Shreveport and that the work will be pushed without delay. The railroad is already completed, and in operation from Kansas City to Siloam Springs, Ark., 230 miles. Another short section is built north from Texarkana, Ark., so that in all about 300 miles remain to be constructed. The stock of the Arkansas Construction Co. has been sold and the proceeds will be used in the construction of the line.

Louisiana, East & West Central Texas.—This company filed its charter at Austin, Tex., last week. This company proposes to construct a road through San Augustine County to the Sabine River and thence to a point on the Red River in Louisiana; also, from Nacogdoches to Fort Worth, in Tarrant County. The office will be at Nacogdoches, Tex. The incorporators are E. O. Blount, A. B. Blevins, B. S. Wettermark, John Schmitt, W. P. Mims, P. A. Blakey, John T. Garrison, Giles R. Crain, E. C. Blanch and Roland Jones.

Mexican Northern.—It is announced that this railroad is to be extended from Sierra Mojada, Mex., to the rich mining camp of Carmen, on the Rio Grande, and thence across Presidio County, Tex., to Marathon, where connection will be made with the Southern Pacific road.

Missouri, Kansas & Texas.—The contract for the extension of the road to Wichita Falls, Tex., was last week awarded to Burkett, Burns & Murphy, of Palestine, Tex. This branch is known as the Wichita Falls road. It is to be about 20 miles long, in Northern Texas, from the main line of the Missouri, Kansas & Texas.

New Roads.—A syndicate is being formed in York, Pa., with a view of purchasing the Susquehanna & Tidewater canal when it is sold by the Receivers. The plan is to use the towpath of the canal for a railroad from Wrightsville, Pa., to Havre de Grace, Md. Wrightsville is within a short distance of the point selected by the eastern extension of the Western Maryland Railroad for bridging the Susquehanna River in order to connect with the Philadelphia & Reading Railroad. The proposed road will be a direct competitor with the Columbia & Port Deposit Railroad, now operated by the Pennsylvania Railroad Company.

A local company is being organized at Tecumseh, the county seat of Pottawatomie County, Okla., to build a railroad from the town four miles to the north, to intercept the Choctaw, Oklahoma & Gulf road, west of Shawnee and Choctaw City.

Oklahoma Central.—The surveys for this road have now been made from Hunnewell, Kan., a town near the southern State line, to the town of Parker, in Oklahoma. This work, it is thought, will be undertaken in a few months. The company has been organized with H. Stout, of Parker, President, and George H. Brett, of New Ponca, Oklahoma, as Chief Engineer.

Paducah, Harrisburgh & Chicago.—J. H. Hildreth, of Chicago, has been elected President of this company, which proposes the construction of a line from the Ohio River opposite Paducah, Ky., north through Southern Illinois. S. S. Barber, of Eddyville, Ill., is one of the chief local projectors.

Pennsylvania Midland.—The road is now completed almost to Osterburg, Pa., and trains are run daily. Contractor E. A. Tennis is making good headway and says the road will be in full operation early next spring. The line is being built from Cessna, 11 miles from Osterburg.

Rayne & Church Point.—Preliminary surveys are to be made at once for this short railroad from Rayne, La., north through Acadia County to Church Point. Rayne is a small town on the Southern Pacific, a few miles east of Crowley, where the Louisiana Western Branch of the Southern Pacific leaves that company's main line through Louisiana.

Rio Grande Northern.—R. E. Russell, of San Francisco, President of the railroad, is now in Texas, and last week awarded the contract for building the road from the San Carlos coal fields, near El Paso, Tex., to Chispa, Tex., on the Southern Pacific. The contractor is G. Kiel, of San Antonio. The work is to begin January 1.

Sturgis Belt.—The construction of the belt line through Union County, Ky., proposed last summer, has been undertaken by the St. Louis Construction Co., of which L. C. Garrett, of Chicago, is Director. The road has been surveyed from the coal mines at Rocky Springs, eight miles from Sturgis, through Union County to the Ohio River at the town of Caseyville.

Texarkana & Ft. Smith.—The contract for building the road north through Sevier County, Ark., has been let to W. C. Merritt, of Texarkana. Work will commence at once. F. W. Tabum is engineer in charge.

Union Pacific, Denver & Gulf.—Judge Hallett, of the United States Circuit Court at Denver, has granted the petition of Receiver Trumbull, to be permitted to annul the contract with the Denver & Rio Grande for the use of the tracks of the latter between Pueblo and Trinidad, and for leave to construct an independent line between those points. The length of the proposed line is 90 miles and the estimated cost of construction \$1,000,000. Unless a compromise is effected, Receiver Trumbull, it is claimed, will begin to build the new road at once. Judge Hallett authorized Receiver Trumbull to issue Receiver's certificates to the amount of \$1,000,000 for the construction of the road. Mr. Trumbull's argument is that the new line will connect disconnected portions of the Gulf road, and add largely to its value. The construction of the road will result in a loss to the Denver & Rio Grande of \$185,000 rental a year for the use of the tracks between Pueblo and Trinidad. Judge Hallett gave an opinion that \$100,000 would be ample rent.

GENERAL RAILROAD NEWS.

Chattanooga Southern.—The sale of the railroad has again been postponed by Judge Newman, of Atlanta, to January 31. The cause of this postponement is due to the action taken by the bondholders and Central Trust Co., of New York. The bondholders have organized a company to purchase the road and have completed arrangements for the sale, but to give time to comply with legal requirements in regard to the organization of the new company the sale was asked to be delayed until January 31, when the road will be sold.

Cincinnati Southern.—Judge Lurton, of the United States Circuit Court at Nashville, has settled the form of decree for the foreclosure of the mortgage securing the bonds known as the "Cincinnati Extension 5's," and signed the order of sale. This decision is adverse to the Cincinnati, Hamilton & Dayton interests.

The Ohio Supreme Court has decided the famous Cincinnati Southern Railroad cases, affirming the judgment of the lower Court. The effect is to bring about an arbitration of the differences between the trustees of the road with the lessees, the Cincinnati, New Orleans & Texas Pacific Railroad Company, and to perpetuate the trustees, whom the City of Cincinnati sought to oust.

Cleveland, Cincinnati, Chicago & St. Louis.—This company has recently secured control of the new Louisville & Jeffersonville bridge across the Ohio River at Louisville. The bridge is to be completed in January. The daily newspapers have confused this bridge with the Kentucky & Indiana, and erroneously reported that the control of the latter had been secured. The bridge company was compelled to default on the interest on its first mortgage bonds in September, 1893, and Receivers were appointed. Attempts at reorganization have failed, and now the Chesapeake & Ohio and "Big Four" have agreed to complete the work on the bridge and terminals and guarantee the interest on the bonds and will take control of the property. The "Big Four" is negotiating with the Baltimore & Ohio Southwestern for the use of its line from North Vernon, Ind., the terminus of the "Big Four," Michigan division, to Louisville, a distance of 57 miles. The Chesapeake & Ohio now uses the tracks of the Louisville & Nashville from Lexington into Louisville.

Galveston, Houston & Henderson.—The Texas Court of Civil Appeals has affirmed the decision in the case of Olcott vs. the International & Great Northern Railway on appeal from Harris County. This is the suit of the Missouri, Kansas & Texas to secure entry to Galveston over the tracks of the Galveston, Houston & Henderson Railway, now under lease to the International & Great Northern. The stock of the Galveston, Houston & Henderson, is owned by the Missouri, Kansas & Texas. The case was made when all the roads were controlled by the Missouri Pacific interest. Since the Missouri, Kansas & Texas was re-organized as an independent road, it has been endeavoring to secure the right of way into Galveston, over the track of the Galveston, Houston & Henderson, but the lease of that road has prevented.

Lake Shore & Michigan Southern.—The following report for the year ending Dec. 31, was published last week. December is partly estimated.

	1894.	1893.	Dec.
Gross earn.....	\$19,534,945	\$23,685,933	\$4,169,988
Oper. expen.....	13,158,379	17,123,913	3,965,534
Net earn.....	\$6,366,566	\$6,562,020	\$195,454
Fixed charges.....	3,360,000	3,365,376	5,376
Balance to stock.....	\$3,006,566	\$3,196,644	\$190,078
Dividends.....	2,967,990	2,967,990	.....
Surplus.....	\$38,576	\$228,654	\$190,078

The operating expenses include all expenditures. Nothing has been charged to construction or equipment since 1893. The profits are equal to 6.08 per cent. on the stock, against 6.46 per cent. the previous year. A semi-annual dividend of six per cent. has just been declared.

Michigan Central.—The following report of earnings for the year to Dec. 31 was published last week, December earnings being partly estimated.

	1894.	1893.	Dec.
Gross earn.....	\$12,700,000	\$16,178,000	\$3,478,000
Oper. expen.....	9,173,000	12,288,000	3,115,000
Net earn.....	3,527,000	3,890,000	363,000
Int. and rental.....	2,401,000	2,402,000	1,000
Surplus.....	1,126,000	1,488,000	362,000
Prop. to Can. Sothern.....	323,000	456,000	133,000
Balance.....	803,000	1,032,000	229,000
Other income.....	44,000	46,000	2,000
Total income.....	847,000	1,078,000	231,000
Dividends.....	749,828	1,030,601	280,773
Balance.....	\$97,172	\$47,399	Inc. \$49,773

The Michigan Central has declared a semi-annual dividend of two per cent. The Canada Southern Company has declared a semi-annual dividend of 1½ per cent., payable Feb. 1. The company received from the Michigan Central, as shown in its statement given above, \$323,000, as against \$456,000 last year. Dividends for the year called for the disbursement of \$375,000, as against \$450,000 last year, leaving a deficit of \$52,000, as against a surplus of \$6,000. The company brought forward a balance of \$190,599 from the previous year; hence it now shows a balance of \$138,599.

Mt. Penn Gravity.—A special committee has reported to the stockholders a plan for the reorganization of the Mt. Penn Gravity Railroad Co. at Reading, Pa. It calls for a loan of \$30,000 from the stockholders and others, which will be secured by second mortgage bonds. Each subscriber to the loan will secure a certain amount of preferred stock as bonus. The plan has been agreed to by the stockholders.

New York, New Haven & Hartford.—The New Haven correspondent of the New York Evening Post denies the report that this company is to build deep water wharves near New York. Negotiations have been made for pieces of land, not extensive, about two miles from the Harlem River, and not upon the water front, for the enlargement of present freight-trackage, and to enable the company to handle trains more promptly. A petition is to be presented to the next Legislature for an extension of present electric street car lines from Stratford to Woodmont. A more serious parallel is threatened between New Haven and Ansonia. Altogether there are now trolley parallels of the New Haven system in Connecticut, Rhode Island and Massachusetts, amounting to nearly 150 miles, but officers of the company do not seem to regard the competition as very serious. The same correspondent says that plans for the costly improvement at

Norwalk, involving a new station, the elevation and widening of the drawbridge, and the elimination of five grade crossings, have been agreed upon and approved by all the parties at interest. They will cost about \$750,000. President Clark has proposed that the elevation and increase of the tracks through Bridgeport be left to the

New York, Pennsylvania & Ohio.—The annual report of the railroad for the year ending Sept. 30 last, shows receipts from the Erie road as rental of \$1,254,205, out of total net earnings of \$1,425,753. The amount due from the Erie was \$1,910,327 and other income and the sale of \$58,660 Chicago & Erie bonds, which were applied to the payment of prior lien interest, make a total of \$2,018,272 as the earnings which the road should have had. The \$1,254,205 received from the Erie was only sufficient to pay taxes and interest on the \$8,000,000 prior lien bonds. The amount of arrears of net earnings due as of Sept. 30 is \$181,548. It is announced that the draft of \$102,250 drawn on the Erie and payable in October, 1893, and that for \$205,000, payable in November, 1893, are still unpaid. Freight tonnage decreased 857,076 tons during the year, and coal decreased 841,680, compared with last year.

Northern Pacific.—Judge Jenkins of the United States Circuit Court, at Milwaukee, has made an order authorizing the Receivers of the railroad company to pay the interest upon the first mortgage bonds due Jan. 1, also the sinking fund charges. The interest amounts to \$1,301,790, and the sinking fund requirement to \$341,215.

Old Colony.—The railroad company has applied to the Massachusetts Railroad Commissioners for leave to sell 2,000 shares of stock by auction.

Oregon Pacific.—This road was sold at Corvallis, Ore., on Dec. 22, in the foreclosure proceedings brought by the Farmer's Loan & Trust Co., of New York, to Bonner & Hammond, of Missoula, Mont., for \$100,000. The road is 147 miles long, extending from Yaquina Bay, on the Pacific Coast, easterly through Corvallis to Albany Ore.

Philadelphia & Erie.—Some individual stockholders of the company have decided to begin suit against the Pennsylvania Railroad Co. to secure an investigation of the relative accounts of the two corporations. It is expected that the city of Philadelphia, which is a large stockholder, owning about 1,250 shares in the road, will be asked to unite in the suit.

Philadelphia & Reading.—An official announcement from the management states that proxies for 300,000 shares of stock have already been deposited in favor of the re-election of the present Directors. The total capital stock of the company is about 800,000 shares.

Richmond & Danville.—Judge Goff, in the United States Circuit Court, in Richmond, last week, discharged Messrs. Foster and Huidekoper as Receivers of the railroad company, and confirmed the sales of Richmond & Danville property recently made to the representatives of the Southern railway.

Southern.—A statement showing the gross and net earnings for each month of the fiscal years 1891, 1892, 1893 and 1894, and for the first four months of the current fiscal year has been published. The statement shows that the road (4,404 miles) has earned in the first four months of the current fiscal year gross, \$6,149,247, an increase of \$329,334, and net \$1,936,887, an increase of \$486,272.

Washington & Chesapeake Beach.—Messrs. Winfield J. Taylor and L. H. Hyer were last week appointed by Judge Cox Receivers of the railroad company in the suit of D. S. Robinson against that company.

West Nashville.—This railroad at West Nashville, Tenn., was sold under order of the Courts at Nashville, Tenn., for \$10,500 to a representative of the Block-Pollak Company, of Chicago and Cincinnati. The future operation of the road is undecided, but the purchaser states that the road will continue to operate for a time at least.

Wheeling & Lake Erie.—The special meeting of the stockholders of the company, called for Dec. 22, adjourned to the third week in January. It is understood that this action was taken because of negotiations which are pending in connection with the Valley Railway, of Ohio, which may call for modification of the original plan of financing the company so far as it relates to the second mortgage bondholders.

Valley (Ohio).—The Baltimore & Ohio has reached an agreement with the second mortgage bondholders of the Valley Railroad of Ohio, and with some of the large holders of the Valley first mortgage bonds. Under the agreement the Baltimore & Ohio will issue new bonds on the Valley road and will guarantee them. In this way the company will retain full possession of the Valley lines. It will extend to the Wheeling & Lake Erie and other roads the right to use the Valley line under traffic contracts.

TRAFFIC.

Traffic Notes.

The Trunk Line presidents met in New York City on Dec. 21 and ratified the action of the meeting held at Buffalo in November, abolishing commissions on east-bound passenger tickets after Jan. 1.

The rule to charge for bicycles and baby carriages as extra baggage has lately been put in effect by a large number of roads. The rates are very low, however; 100 lbs. on bicycles and 50 lbs. on baby carriages.

The Lake Shore & Michigan has given positive instructions to conductors to carefully scrutinize signatures of holders of mileage books, and to take up any book in which the signature of the holder does not agree with that given on the cover. The scalpers are reported as very much worked up over this "illegal" action on the part of the road.

The elevated railroads in New York and Brooklyn have issued orders that policemen, being State officers, and therefore within the prohibition of the new clause in the State constitution, must not be carried free after January 1. A number of street railroads have issued similar orders. One road has ordered the exclusion of members of the fire department also.

Mr. F. G. Jewett, of Albany, N. Y., Manager of the Central New York Car Service Association, has issued in pamphlet form a copy of a decision rendered by Judge Parker, of the New York Supreme Court, sustaining the Delaware, Lackawanna & Western Railroad in a suit brought by a shipper to recover some lumber which the road had held as a lien for demurrage charges which the consignee refused to pay. The decision holds \$1 a day reasonable as a demurrage charge, and sustains the road at every point.

The Galveston merchants, having failed to induce the State Railroad Commissioners of Texas to give their city a more favorable rate on cotton from the interior, as compared with Houston, have now turned their attention to the Interstate Commerce Commission. Commissioner Groseclose, of the Freight Bureau, has filed a complaint

at Washington alleging inequality of the rate from Houston to Galveston as compared with that from Houston to New Orleans, the latter being an interstate rate. The Southern Pacific, having only a minor interest in Galveston, carries cotton to New Orleans at a very low rate, said to be 18 cents per 100 lbs. from Houston, and the cost of transportation through to Atlantic seaboard and European points is said to be the same as via Galveston.

After this week, dining cars will be run on the New York & Florida Short Line limited train of the Southern Railway. This train leaves New York over the Pennsylvania at 3.20 p. m., and reaches Jacksonville, via the Florida, Central & Peninsular, at 7.30 p. m., the next day. Dinner and supper are served on the train between Jersey City and Washington, and the dining car which serves the second day's meals runs through to St. Augustine. This train now runs through solid. The Southwestern vestibule limited is a separate train, leaving New York at 4.30 p. m., and running from Washington, D. C., to Charlotte, N. C., about one hour behind the Florida limited. The New York and Florida special, of the Atlantic Coast Line, will be put on for the winter season on Monday, January 7. This train leaves New York at 4.30 p. m., and arrives at Jacksonville at 7.05 the next evening.

Chicago Traffic Matters.

CHICAGO, Dec. 26, 1894.

Eastbound shipments show a falling off last week as compared with the preceding week and a decrease of nearly one-half compared with the corresponding week of 1893. There is no material change in the rate situation eastbound, which is in as satisfactory a state as could reasonably be expected. Western rates are generally being well maintained.

The Atchison has appealed from Judge Grosscup's decision in the stock yards switching case to the United States Court of Appeals. The road will obey the order of the Circuit Court pending the hearing of the appeal. The Receivers regard Judge Grosscup's decision as erroneous and they are unwilling to appear to tacitly consent by failing to appeal, thus possibly subjecting themselves to criticism from the bondholders.

Material progress was made last week in smoothing over the differences in the conference over trans-continental passenger rates. Regarding the demand of the Canadian Pacific for differentials via Port Arthur and St. Paul and the "Soo" Line, a compromise has been reached whereby the Western lines concede the Canadian Pacific differentials of \$10 first class and \$5 second class on Pacific Coast business via Port Arthur, not to apply to Detroit and Central Traffic territory, but east of Buffalo only; and the Canadian Pacific waives its claim for a differential via Chicago and St. Paul. The Western lines agree to allow the Canadian Pacific a share of the immigrant business, provided it becomes a member of the immigrant clearing house. The C. P. is still fighting against joining the clearing house, but as the aggressive action of the Western lines in connection with the Grand Trunk in meeting the commission payments of the Canadian Pacific from Canadian ports is seriously affecting that line, it will probably agree to the demands of the Western lines. The Grand Trunk is inclined to feel aggrieved at the action of the Western lines in agreeing to differentials from Canadian territory, but the Western lines argue that the position of the Grand Trunk will be no worse under the proposed arrangement than it has been for some time, while the advantages secured by the Western lines in return for the differentials are all-important to them. The Atchison has agreed to the advance in rates proposed by the Southern Pacific, conditioned upon that company ratifying the recently proposed agreement between the two companies respecting California business, the principal feature of which admits San Francisco and Lower California points to the round trip rates without extra charge. These points settled, there remains to be settled only the so-called boycott of the Burlington and the Rock Island against the Union Pacific in retaliation for the closing of the Denver and Ogden gateways by the U. P. All these matters are so interdependent, however, that an agreement is by no means assured until every one is amicably and definitely adjusted.

The Chicago & Northwestern and the Burlington both put on fast mail trains to Omaha, Dec. 23. The Northwestern train leaves Chicago at 3 a. m. and arrives at Omaha at 3 p. m. The Burlington leaves Chicago at the same hour and arrives at Omaha at 2.20 p. m.

The Central Traffic Association meeting to consider division of eastbound business failed for want of attendance.

Chairman Midgley, of the Western Freight Association, expresses regret and disappointment that with the close of navigation the Eastern lines have not restored and maintained westbound tariffs, but on the contrary such low rates have been made from the Atlantic seaboard to Mississippi River crossings that the Western lines are in danger of becoming participants criminals in unlawful acts of Eastern roads by protecting such rates. He issues instructions to members that they shall not in any case protect such reduced through tariffs of initial Eastern lines unless the line east of Chicago will accept 56 per cent. of the gross through rate from the initial shipping point to St. Paul or Minneapolis, and no reduced through rates should be authorized by the National Despatch or the Kanawha Despatch unless a tariff via the "Soo" is produced to justify the reduction. No arrangement of a similar nature can be made with any other than these two lines without Association sanction.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending Dec. 22, amounted to 39,887 tons, against 40,486 tons during the preceding week, a decrease of 599 tons, and against 80,026 tons for the corresponding week last year. The proportions carried by each road were:

ROADS.	WEEK TO Dec. 22.		WEEK TO Dec. 15.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central.....	2,314	5.9	2,251	5.1
Wabash.....	4,783	12.0	2,675	6.7
Lake Shore & Mich. South.....	6,158	15.4	5,526	13.7
Pitts., Ft. Wayne & Chicago.....	5,011	12.5	5,346	13.3
Pitts., Cin., Chi. & St. Louis.....	4,712	11.9	5,975	14.8
Baltimore & Ohio.....	4,051	10.1	3,135	7.8
Chicago & Grand Trunk.....	3,377	8.5	5,477	13.5
New York, Chic. & St. Louis.....	2,230	5.6	3,258	8.1
Chicago & Erie.....	4,399	11.0	4,938	12.3
C., C. C. & St. Louis.....	2,852	7.1	1,885	4.7
Totals.....	39,887	100.0	40,486	100.0

Of the above shipments 2,281 tons were flour, 11,560 tons grain and mill stuff, 7,881 tons cured meats, 8,032 tons dressed beef, 1,270 tons butter, 2,114 tons hides, and 4,588 tons lumber. The three Vanderbilt lines carried 26.9 per cent., the two Pennsylvania lines 24.4 per cent.

